Nutritional status in head and neck cancer patients

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Abstract. – *Objective:* Patients suffering from cancer of head and neck are at risk of nutritional depletion. The aim of our study was to investigate the role of type, location and stage of tumors in nutritional status.

Patients and Methods: A population of 230 consecutive patients with head and neck cancer was enrolled. A nutritional evaluation was realized.

Results: The distribution of tumour sites was: oral cavity (77 patients), pharynx (30 patients) and larynx (123 patients). Subjective Global Assessment (SGA) test showed significant differences. Midly malnourished frequency is higher in larynx site than others. Severely malnourished is higher in larynx and oral cavity than pharynx. In pharynx, larynx and oral cavity tumours is more frequent to be well nourished than severely malnourished. In pharynx and larynx tumours is more frequent to be mildly malnourished than severely malnourished. In stages II, III and IV are more frequent to be well nourished than severely malnourished and in stages II and III is more frequent to be mildly malnourished than severely malnourished.

Conclusions: SGA test shows a good nutritional status in patients with head and neck tumours. However, SGA test shows statistical differences in some categories of tumours stages or sites.

Key Words:

Anthropometric parameters, Biochemical parameters, Head and neck cancer, Nutritional Status, SGA test.

Introduction

Patients suffering from cancer of head and neck are at risk of significant nutritional depletion due to several factors[1,2]. These patients have a lifestyle in which excessive alcohol consumption; smoking and poor dietary habits are notable features. The location of the tumour often leads to significant odynophagia and dysphagia resulting in a reduced dietary intake. One would think that the degree of malnutrition is, in part, dependent on the location and bulk of the tumour. Extensive cancers in the head and neck area may lead to anorexia secondary to chronic pain, anxiety and chemical mediators[3]. However, the influence of tumour location and stage on nutritional status in patients with head and neck cancer has been studied much less rigorously than other tumors.

Patients with head and neck cancer undergoing surgery have a high incidence of local postoperative complications (anastomotic fistula and wound infections)[4] and have a lot of problems in swallow function and perception of dysphaghia[5]. Nutritional status in these patients may be study to classify patients of high risk.

The aim of our study was to investigate the role of type, location and stage of tumors in nutritional status of patients with head and neck cancer.

Material and Methods

Patients

A population of 230 consecutive patients with head and neck cancer was enrolled. Baseline studies on all patients consisted of complete hystory taking, physical examination, anthropometrical evaluation, nutritional biochemical determination and SGA test. Protocol was approved by Ethic Committee of our Hospital.

Anthropometric Measurements

Body weight was measured to an accuracy of 0.5 kg and body mass index computed as body

weight height[2]. Bipolar body electrical bioimpedance was used to determine body composition. An electric current of 0.8 mA and 50 kHz was produced by a calibrated signal generator (Biodynamics Model 310e, Seattle, WA, USA) and applied to the skin using adhesive electrodes placed on right-side limbs. Resistance and reactance were used to calculate total body water, fat and fat-free mass. Regional changes in body mass were stimated by measuring the circunferences and skinfold of the forearm.

Biochemical Assays

Fasting blood samples were drawn for measurement of, albumin (3,5-4,5 gr/dl), prealbumin (18-28 mg/dl), transferrin (250-350 mg/dl), with an autoanalyzer (Hitachi, ATM, Mannheim, Germany). Lymphocytes (1.2-$3.5.10^3$/uL) were analyzed with an analyzer (Beckman Coulter, Inc, LA, CA).

SGA (Subjective Global Assessment) Test

SGA was performed as described by Detsky et al[6] and modified by Hasse et al[7]. The SGA comprises a nutritional evaluation of height, current weight, before illness, and weight change in the previous 6 months; nutritional history (appetite, intake, gastrointestinal symptoms); physical appearance (subjective assessment of fat loss, oedema, muscle wasting and ascites) and existing conditions (infections, encephalopathy, renal insufficiency). Based on this evaluation the patients were classified into three groups; well nourished, mildly malnourished and severely malnourished. Patients were classified in three groups; 0 (well nourished), 1 (mildly malnourished) and 2 (severely malnourished).

Statistical Analysis

The results were expressed as mean ± standard deviation. The distribution of variables was analyzed with Kolmogorov-Smirnov test. Quantitative variables with normal distribution were analyzed with two tailed paired, unpaired Student's t-test and ANOVA test. Non-parametric variables were analyzed with the Friedman and Wilcoxon tests. Qualitative variables with normal distribution were analyzed. A *p*-value under 0.05 was considered statistically significant.

Results

The patients range from 49 to 81 years of age (68.5 ± 13.1 years) and were predominantly males (212 males and 18 females).

Patients were divided in three site groups; pharynx, larynx and oral cavity. Patients were classified in tumour stage[8], too. The distribution of tumour sites and overall stages is summarized in Table I.

Individual anthropometric and biochemical variables were compared in Table II. No differences were detected among groups of sites. Groups of patients divided by overall staging did not shown statistical differences (Table III). Neither tumour sites nor overall staging were predictive of nutritional status.

Subjective global assessment test showed significant differences in frequencies of well nourished, mildly and severely malnourished patients with each site of tumours (Table IV). Mildly malnourished frequency is higher in larynx site than others and severely malnourished is higher in larynx and oral cavity than pharynx. In pharynx, larynx and oral cavity tumours are more frequent to be well nourished than severely malnourished and in pharynx and larynx tumours is more frequent to be mildly malnourished than severely malnourished.

SGA test showed significant differences in frequencies of well nourished, mildly and severely malnourished patients with each overall staging of tumours (Table V). Midly malnourished frequency is lower in stage III than other stages. Well nourished and severely malnourished frequencies were similar in the rest of categories. In stages II, III and IV are more frequent to be well

Table I. Tumour sites and overall stating[8].

Site	I	II	III	IV	Total
Oral cavity	0	30	31	16	77
Pharynx	0	4	10	16	30
Larynx	0	7	41	75	123

Table II. Tumour sites and nutritional status.

Site	Pharynx	Larynx	Oral cavity	*p*
Age (years)	56.6 ± 10	62.6 ± 11.6	59.2 ± 13.4	Ns
BMI	24.8 ± 3.6	25.3 ± 4.4	24.2 ± 3.8	Ns
Weight (kg)	69.4 ± 14	69.8 ± 14.1	67.4 ± 10.9	Ns
Tricipital skinfold (mm)	12.7 ± 7	12.6 ± 5.9	12.5 ± 6.2	Ns
Circumference arm (cm)	28 ± 4.2	29 ± 3.6	28 ± 3.8	Ns
Fat mass (kg)	12.9 ± 7.8	12.8 ± 8.7	14 ± 10.9	Ns
Fat free mass (kg)	56.2 ± 11	55.7 ± 10.8	53.5 ± 10.6	Ns
Albumin (g/dl)	2.4 ± 0.5	2.5 ± 0.5	2.8 ± 0.6	Ns
Prealbumin (mg/dl)	11.8 ± 4.6	13.4 ± 9.6	14 ± 5.3	Ns
Transferrin (mg/dl)	158.8 ± 37	137 ± 34	136 ± 49	Ns
Lymphocytes (103 uL/mm^3)	1158 ± 669	1284 ± 1004	1191 ± 613	Ns

nourished than severely malnourished and in stages II and III is more frequent to be mildly malnourished than severely malnourished.

Discussion

Anthropometric and biochemical nutritional parameters are similar in different sites and over-all stage of head and neck tumours patients. SGA test shows a good nutritional status in patients with head and neck tumors. However, SGA test shows statistical differences in some categories of tumours stages or sites.

Previous data have showed a high rate of malnutrition in these patients. Malnutrition is a typical characteristic of head and neck cancer patients[9,10]. It is reported in 50% of these patients[11]. Perhaps these differences with our study could be explained because these previous studies have evaluated patients with different stages, sites and nutritional evaluation tools. Some studies evaluated patients near to the surgery with a clear malnourished state and bad prognosis. For example, Van Bokhorst-de van der Schueren et al have reported that patients with head and neck cancer and weight loss exceeding 10% during the six months before surgery are at great risk of the occurrence of major complications[12].

Accepted indicators of impaired nutritional status include both objective and subjective tools. A subjective method of nutritional assessment (the subjective Global Assessment) has been validates against accepted objective measures[13]. In our study, SGA test detected better nutritional differences among tumours overall staging and sites than other individual parameters. Wiel et al.[14] have shown than nutritional status in head and neck tumour patients seems to be best assessed by loss weight than other parameters.

Table III. Tumour sites and overall staging.

Site	II	III	IV	*p*
Age (years)	66.5 ± 11	67 ± 11.8	70 ± 14	Ns
Weight (kg)	69.6 ± 11	69.1 ± 10.9	72.7 ± 13.4	Ns
BMI	24.2 ± 3.7	24.7 ± 3.7	25 ± 5	Ns
Tricipital skinfold (mm)	12.9 ± 6.7	12.6 ± 5.8	12.5 ± 6.3	Ns
Circumference arm (cm)	24.6 ± 3.1	24.4 ± 2.7	25 ± 2.6	Ns
Fat mass (kg)	14.8 ± 8.5	12.3 ± 6.7	13.4 ± 8.6	Ns
Fat free mass (kg)	53.2 ± 10	54.1 ± 10.7	56 ± 10.8	Ns
Albumin (g/dl)	2.6 ± 0.5	2.5 ± 0.6	2.4 ± 0.5	Ns
Prealbumin (mg/dl)	11.6 ± 4.6	12.4 ± 5.6	13.1 ± 5.4	Ns
Transferrin (mg/dl)	146 ± 55	137 ± 36	141 ± 50	Ns
Lymphocytes (103 uL/mm^3)	1179 ± 608	1384 ± 1104	1277 ± 903	Ns

Stage I is empty, no patients in this catergory.

Table IV. Tumour sites and percentage of patients in each category of sga test.

Site	Pharynx	Larynx	Oral cavity	*p*
0	75.9%*	57.3%*	68.8%*	Ns
1	24.1%*	36.3%$*	18.2%	*p* < 0.05
2	0%	6.5%$	13%$	*p* < 0.05

0 (well nourished), 1 (mildly malnourished) and 2 (severely malnourished). (*) statistical differences in each site of tumor. ($): statistical differences in each category of SGA test.

Table V. Overall staging and percentage of patients in each category of sga test.

Site	II	III	IV	*p*
0	63.4%	70.7%	57.1%	*p* < 0.05
1	26.8%*	22%$,*	35.2%	*p* < 0.05
2	9.8%*	7.3%*	7.6%*	*p* < 0.05

0 (well nourished), 1 (mildly malnourished) and 2 (severely malnourished). 0 (well nourished), 1 (mildly malnourished) and 2 (severely malnourished). (*) statistical differences in each overall staging. ($): statistical differences in each category of SGA test.

In some studies nutritional status has been correlated with the stage of the tumour[15] but not with sites. Demographic characteristics of these patients[15] were different than ours (younger and earlier stages than our patients), this fact could explain different results in these studies.

Nutritional intervention improves the caloric intake and protein ingestion of head and neck cancer patients under oncologic treatments[16]. Other studies[17-19] confirmed that an enteral diet supplementated with arginine in the early postoperative period improved postoperative immunological status and speed up recovery from the immunodepression following surgical injury in this entity. Snyderman et al[20] with a perioperative nutritional supplementation with an immune-enhancing formula was superior to standard formula in the prevention of postoperative infectious complications. In this way, a nutritional evaluation and a good classification is needed to these patients before the surgery.

In conclusion, SGA test detects a good nutritional status in patients with head and neck tumors. However, SGA test shows statistical differences in some categories of tumours stages or sites, which have not been detected by other nutritional parameters.

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