A Study of Head and Neck Cancer to Determination of Nutritional Parameters

*Pragna H. Solanki. (Ph.D.Food & Nutrition). **Dr Daxaben.N.Mehta

Abstract:

Head and Neck Cancer to determination of the optimal nutritional parameter to provide useful information for the individual patient and assessing the impact of nutritional status have on the prognosis.

Key words:

Bio Impedance Analysis (BIA), Head & Neck Cancer (HNC), Nutritional Status (NS), Weight Loss (WL).

Aim to this study Determination of the optimal nutritional parameter to provide status information for the individual patient and assessing the impact of nutritional status has on the prognosis of head and neck cancer.

Patients and Methods in this study Firstly a retrospective study analyzed the outcome of 110 patients in relation to initial weight loss and weight loss at the end of radiotherapy. In here second study observatories the difference bio impedance (BIA) data of 27 survivors and 39 patients who died between their first and last measurement during nutritional therapy in at least four weeks.

Results:

In the cancer patients critical initial weight loss is 10 kg or more at the point of diagnosis. At the end of radiotherapy the cancer patients of body mass reduction should be less than 15 kg. In the study of raw data of BIA reflect the changing nutritional status at the end of life. I observed a stabilized phase angle in survivors (4.7° to 5.2°) whereas patients who died exhibited a significant lower phase angle (4.6° to 3.7°, $p < 0.05$). Describe the relation between nutrition and prognosis of individual in Head and Neck Cancer patients.

Conclusion:

The prognosis of head and neck cancer patients is highly related to their nutritional status. Specific nutritional history (initial weight loss, total weight loss, body mass index) and additional biophysical measurements such as BIA are recommended to monitor the individual status during the follow-up.

Head and neck cancer is newly diagnosed for 1400 patients in India per year. The treatment includes surgery, radiotherapy, and treatment with antibodies. A common side-effect of therapy is the development of dysphagia and other disturbances of daily nutrition intake.

Currently there are no good markers of the prognosis of cancer disease. Tumor markers have been investigated and have a high specificity, but low sensitivity. Hence, other clinical and non- clinical signs, which allow specifying the prognosis of an individual, are sought. Therefore, I performed two analyses in a group of patients with head and neck cancer patients. In study to describe the relation between nutrition and prognosis of individual patients. Some years ago I tried to describe a critical point of no return in regard to the loss of body mass. These earlier data will be presented as the first part of this is study 1. The second part will report new biophysical measurements of impedance in cancer patients during their disease course.

Patients and Methods:

Study 1. 110 patients were included to a retrospective analysis of total survival and disease free survival in relation to the initial loss of body weight (time of diagnosis) as well as the loss of body weight and the end of radiotherapy.

All patients were treated at the departments of GCR and radiotherapy of the Gujarat Hospital. All patients suffered from squamous cell carcinoma of the head and neck region and had shown an advanced stage of the disease.

The standard therapy regimen included laser surgery plus neck dissection plus simultaneous radiotherapy with a total dose of 60-70 G and carboplatin as radio-sensitizer. If the tumor was not resettable, the patients received simultaneous radiotherapy only.

Table I

Summarizes the biometric data of the included patients, the performed therapies, and the tumor localizations. The regional tumor data base of the state of Gujarat was used to obtain official information about the survival of each patient included. Anamnesis data were recorded from the individual data files at the both Departments, resulting in individual data sets for each patient, including three parameters: survival time, initial weight loss, weight loss by the end of treatment. All data were used for Kaplan-Meier calculations performed, statistician of the Gujarat Tumor Registry at GCS. The following procedure was used to find out the critical level of weight loss. In the study population was divided into two groups with weight loss less and more of the possible critical point and the median survival time and 3-year-survival were compared. I defined the critical level of weight loss as the weight loss with disadvantages in survival time and survival percentage.

Study 2. A total of 66 patients were included for the measurement of bio impedance (BIA) during their consultations of the Outpatient clinic of the Department of Oncology at the Gujarat Hospital. These patients were treated by the Departments of Oncology, Head Neck Surgery and Radiotherapy at Gujarat between 2016 and 2018. Patients suffered from the head and neck at an advanced stage of the disease. The basic therapy strategy was similar to the regimen described above. BIA was performed every four weeks during the regular follow up visits after finishing baseline treatment. Measurements were carried out by qualified staff. BIA produced resistance, and reactance as raw data and both were used to calculate the phase angle as the specific parameter. All patients were participators of nutritional support therapies because of malnutrition and/or dysphagia. Between 2016 and 2018, I was performed BIA in 66 male patients with head and neck cancer, 27 (41%) were still under follow-up observation, and 39 (59%) of the patients had already died. I was analyzed the first and the last measurement of bio impedance of each patient (interval at least 4 weeks). All BIA were performed with Biacorpus RX400 (Medical G). The relation between BIA data and prognosis of cancer disease was analyzed by comparing the phase angle of the first and last measurement in the group of surviving patients, as well as in the group of patients who had already died, using Kaplan-Meier $\chi 2$- test for dependent study populations.

Results

Table III: Shows the overall survival rates and survival times according to the different critical points of initial weight loss. In study Reflecting weight loss of Cancer patients the p-values as an initial weight loss of 5 kg or more is critical for the individual prognosis of the patient.

Table IV: Shows the overall survival rates and survival times according to the different critical points of total weight loss at the end of radiotherapy. Reflecting the p-values, a total weight loss of 12.5 kg or more is critical for the outcome of the individual patient. As shown in only a quarter of all head and neck cancer patients were well nourished. In shows the different development of the BIA phase angle in survivors and

patients who died during nutritional therapy. The survivors benefited from nutritional support and the nutritional status improved or stabilized at the second measurement. In dying patients a statistically significant decreasing phase angle was found despite nutritional therapy ($p<0.05$). $\chi2$-test for dependent BIA data.

Table V: Summarizes the development of body mass index (BMI) between the times points of BIA measurement.

Table I: Biometric data of patients in	Study I
Gender	
Male	91
Female	19
Age, years	
Mean	55.9
Range	25.5-81.1
Tumor	
Oropharynx	62
Hypopharynx	48
Performed Therapies	
Adj radiotherapy	59%
Pri radiotherapy	41%

Table II: Biometric data of patients in	Study II
Gender	
Male	50
Female	16
Age, years	
Mean	67.7
Range	49-89
Tumor	
Oropharynx	18
Hypopharynx	13
Others	35

Table III: Initial weight loss and survival.

Critical Weight loss	N	Median survival Time (Months)	3- years Survival (%)
<2.5 kg	75	27±6	36.6
>2.5 kg	22	19±11	40.4
<5.0 kg	82	27±6	37.2
>5.0 kg	15	14±2	40
<7.5 kg	85	27±6	36.6
>7.5 kg	12	14±2	41.7
<10.0 kg	90	27±5	37.4
>10.0 kg	7	12±7	28.6

Table IV: Total weight loss and survival.

Critical Weight loss	N	Median survival Time (months)	3- years Survival (%)
<2.5 kg	6	10±7	16.7
>2.5 kg	59	38±5	44.7
<5.0 kg	15	18±3	30.5
>5.0 kg	50	38±0	45.4
<7.5 kg	24	20±10	43
>7.5 kg	41	34±4	41.8
<10.0 kg	35	34±0	45.5
>10.0 kg	30	33±17	38.2
<12.5 kg	42	34±1	39.6
>12.5 kg	23	38±0	45.3
<15.0 kg	48	33±4	42.5
>15.0 kg	17	15±15	39.2
<17.5 kg	57	38±0	46
>17.5 kg	8	7±5	12.5
<20.0 kg	62	34±4	44.1
>20.0 kg	3	4±1	0

Study 2 Mean Body Mass Index (BMI) between Measurement Points.

Table V.	Surviving patients		Patients who died	
BIA	First BIA	Last BIA	First BIA	Last BIA
Body Mass Index (kg/m2)	23.6 (15.9-28.3)	23.6 (16.1-27.7)	24.3 (14.7-33.1)	22.6 (12.6-30.1)

Discussion:

Poor nutritional status is related to poor prognosis of cancer disease. This well known phenomenon was seen in both of our studies. The consequence is that structured support is required for patients with nutritional problems. Which diagnostic measurements are able to give us the most relevant information? The WHO and others have defined cachexia as a BMI <18.5 kg/m2. This definition was a consensus of the members of international organizations, but it does not reflect the special situation of patients with chronic diseases such as cancer. Malnutrition of a patient should be defined as an unwanted weight loss of >5% (or >10%) in three (or six) months, or a reduction of BMI to less than 21 kg/m2, or specific laboratory changes (C-reactive protein, albumin, protein, trace elements, vitamins) on the basis of dysphagia or other disturbances of natural nutrition. In this study reflecting this definition, it is possible that patients with higher body weight may become malnourished. These are our high-risk patients in daily work. Specific nutritional data anamnesis seems to be the first essential step in nutritional therapy. H&N cancer patients an initial weight loss of 10 kg or more is related to higher mortality, as well as a total weight loss of 15 kg or more at the end of baseline therapy. Head and Neck Cancer Patients reflecting this definition, it is possible that patients with higher body weight may become malnourished.

Both values are calculated as critical points and such losses should be avoided. In order to standardize the nutritional data anamnesis, I have introduced the usage of screening tools at our Department. I used the Nutritional Risk Score 2002 (NRS 2002). As such a tool for each of our tumor patients. The nutritional data anamnesis should be completed by measuring body mass and length and a second objective measurement value. Possible methods are the measured dynamic hand craft (manual force measurement), the defined skin fold measurement or the bio impedance analysis. In our experience, dynamic hand craft is a very sensitive method with high inters- individual differences. The measurement of skin folds is easy but needs time with malnourished patients it is possible to obtain sufficient data about body cell mass by skin fold measurements. Similar data are produced by BIA.

BIA has to be performed in a standardized cure (electrodes at each extremity, 5 cm distance between the electrodes). The Head and Neck Cancer patient should be in a still position for 5-10 minutes. The measured data include reactance, resistance and phase angle of the patient. All parameters reflect the personal distribution between water, and cellular parts of the body. A phase angle <5° characterizes a patient who develops malnutrition. A phase angle <4° is characteristic of malnourished high-risk patients. The raw data allow the calculation of an individual Piccoli hectograph. This hectograph is very helpful to visualize the personal nutritional situation and to discuss the consequences with the patient and his relatives. Here presented data have shown the high sensitivity of BIA changes related to progressive tumor disease. The BIA method should be used in daily practice as a simple measurement procedure providing additional information of the patient's general status. In the study shows the performance of BIA by GCS staff during the weekly visit of ambulant patients. Laboratory data are useful but not obligatory. The C-reactive protein has shown to be the most sensitive parameter regarding sarcopenia decreased protein or albumins are characteristic as well as disturbed homeostasis of the trace elements selenium or zinc.

References

- A, Rossi B and Pillon G: kondrup J, Rasmssen, Ad, Ho IES PN working Group. Nutrition method for monitoring evelution analysis: the RXc graph. Kidney Int Ho IESPN working Group. Nutrition method for monitoring body fluid variation . C. Nutri 33.376-455, 2011.
- AL, Pl SM, Dig DJ and Visger M: Inflammatory markers and loss of muscle mass and strength. Am J Med 119: 526.9-17, 2010.
- Becker N a Wahr end or f J: Krebsatlas der Bundesre pub Deutschland. Spri, Berlin 1998.
- Bintzel J, Bruns F, Glatzel M, Garayev A, Mücke R, Kisters K, Schefer U, Schenekaes KMicke O: Min Zinc corellations in serum during head and neck cancer Res *27*: 1941-1943, 2007.
- Bri F, Scfer U, Horst E, Bntzel J and Wil N: The clinical value of squamous cell carcinoma gen in patients irradiated for generally advanced cancer of the HN Cancer. Cancer Res *23*: 907-912, 2008.
- Brians F, Schfer U, Horst E, Büntzel J and Willich N: The clinical value of cell carcinoma in patients irradiated for locally cancer of the head and neck. Res 82: 907-912.
- Diup J, Rasmussen H, Hamberg O, Stanga Z; Ad Hoc ISPEN Working Group. Nutritional risk scr NRS 2002: a new clinical trials. Clin Nutr *22*: 321-336.
- Eintzel J, Bruns F, Glatzel M, Garayev A, Mücke R, Kisters K, Schefer U, Schenekaes KMicke O: Min Zinc corellations in serum during head and neck cancer Res *27*: 1943, 2010.
- G, Kossi B and Pillon G: kondrup J, Rasmssen, Ad, Ho IES PN working Group. Nutrition method for monitoring evelution analysis: C. Nutri 33.376-455, 2011.
- Gioulnis I, Pallis AG, Xyrafas A, Dalliani D, Kalbakis K, Papadopoulos V, Mavroudis D, Georgulias V and Papandreou CN: Nutritional status, acute phase response in cancer patients and association prognosis.
- H, Allison SP, Meier R, Pirchlich M, Kondrup J, Schneider St, van den Berghe G and Pichard C: first steap to the ISPEN

Guidelines of nutrition: Clinically Nutrition. Res.197-211.2008.

- H, Hamberg O, Stanga Z; Ad Hoc ISPEN Working Group. Nutritional risk scr NRS 2002: a new clinical trials. Clin Nutr *22*: 2017.

- Ja MS and Malck M: General clinical equations for predict body density and composition. Brit J Nutrition.

- Jackson AS and Pollock M: Generalized equations for predicting body density. Brit J Clinical Nutrition.

- Kondiup J, Rasmussen H, Hamberg O, Stanga Z; Ad Hoc ISPEN Working Group. Nutritional risk scr NRS 2002: a new clinical trials. Clin Nutr *22*: 321-336, 2004.

- LA, Pl SM, Dig DJ and Visger M: Inflammatory markers and loss of muscle mass and strength. Am J Med 119: 526.9-17, 2010.

- M, Fisch H, Polat H, Hel EB, Frenz M, Caspy WF and Lembe B: Bio analysis of survival in patients with human immuno deficiency virus infection. J Acquir Immun Defic Syndr Hum Retrovirol 20- 25, 1995.

- Mick, Brins F, Scfer U, Horst E, Bntzel J and Wil N: The clinical value of squamous cell carcinoma gen in patients irradiated for generally advanced cancer of the HN Cancer. Cancer Res *23*: 907-912, 2003.

- Mn, Allison SP, Meier R, Pirchlich M, Kondrup J, Schneider St, van den Berghe G and Pichard C: first steap to the ISPEN Guidelines of nutrition: Clinically Nutrition. Res.197-211.2008.

- Piccoli A, Rossi B and Pillon G: kondrup J, Rasmssen, Ad, Ho IES PN working Group. Nutrition method for monitoring evelution analysis: the RXc graph. Kidney Int Ho IESPN working Group. Nutrition method for monitoring body fluid variation . C. Nutri 33.376-455, 2011.

- Pl SP, Jig DJ and Visjer P: Inflammatory markers and loss of muscle mass and strength. Am J Med 119: 526.9-17.

- Rossi B and Pillon G: kondrup J, Rasmssen, Ad, Ho IES PN working Group. Nutrition method for monitoring evelution analysis: the RXc graph. body fluid variation . C. Nutri 33.876-855, 2018.

- S, Sasmussen H, Hamberg O, Stang Z; Ad H ISPEN Working Group. Nutritional risk scr NRS 2002: a new clinical trials. Clin Nutr : 320,. Indian Nutritional risk Scr Clinical trials clin nutri 23: 321-336. Hok ISPEN Nutrition Scr.

- VM Papandre: D, Jatoi A, Kalantar ZadehK Bruns F, Schäfer U, Horst E, AM ,Nutritional status, acute phase response metastatic cancer patients: relations and association prognosis. Care Cancer, R and Anker SD: New Definition Clinical nutritional status, Acute phase response metastatic cancer patients relations, association. 223. 2014.