

IDENTIFYING THE NUTRITIONAL REQUIREMENTS TO IMPROVE NUTRITIONAL SUPPORT AND SURVEILLANCE IN SUBJECTS WITH HEAD AND NECK CARCINOMA

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ABSTRACT

Background: Carcinoma of the Head and neck region contributes to nearly 5.1% of all cancers seen globally. In subjects with head and neck carcinoma, nutritional deficiencies present complex and immense challenges. In subjects with difficulty in swallowing with normal gastrointestinal tract functioning, enteral nutrition remains the most common nutritional support provided which is usually given through percutaneous endoscopic gastrostomy (PEG) or nasogastric feeding tube (NGT) tube.

Objectives: The present study was conducted to study different patient cohorts and identify the subjects of head neck and neck cancer requiring nutritional support. Also, the present study was aimed at improving the nutritional surveillance in such subjects.

Methods: In 4 studies system, study I was a prospective study that assessed the metabolic and inflammatory markers in 23 subjects under radiotherapy, study II was retrospective that assessed 150 subjects with PEG tube, study III assessed 146 subjects with nutrition control in head and neck carcinoma for factors leading to the weight loss, and study IV prospectively interviewed life influence by feeding (PEG/NGT) or disease in head and neck carcinoma subjects.

Results: For Study, I, bodyweight loss was seen in all the subjects with most weight loss seen at the end of Radiotherapy with the increase in Highly sensitive C-reactive protein. Concerning complications seen in 56 subjects, it was seen that minor complications were seen in 14% (n=21) subjects, severe complications in 20% (n=30) subjects, and fatal complication in 3.33% (n=5) study subjects. Both radiotherapy and combined therapy subjects had increased body weight from radiotherapy start to 2 weeks following termination. This was followed by a decrease in weight which was maximum at 6 weeks termination.

More weight loss was seen in the combined group compared to the radiotherapy alone group. 19.5% variance was seen. Weight loss in the PEG group was 6.1% whereas in the NGT group was 9.4%. 13 categories in SEIQoL were used to assess the quality of life. The most commonly affected area was interest, personal health, and family relation.

Conclusion: Bodyweight and CRP are reliable parameters for follow-up in subjects with head and neck carcinoma. NGT should be considered as the first choice of enteral nutrition in subjects limited time of tube feeding is expected, whereas in subjects where prolonged treatment is needed PEG can be considered. The continued weight loss following treatment shows the importance of a pre-treatment nutritional surveillance program.

Keywords: Body weight loss, nutrition, enteral nutrition, head and neck cancer, percutaneous endoscopic gastrostomy (PEG), a nasogastric feeding tube (NGT)

INTRODUCTION

Head and neck cancer includes malignant tumors in the ear, salivary glands, larynx, hypopharynx, oropharynx, nasopharynx, sinuses, nose, oral cavity, and lip. Globally, approximately, 633,000 new cases are recorded every year. Nutritional concerns are seen in many subjects with head and neck carcinoma, which can cause under-nutrition bodyweight loss that can be seen secondary to several dysfunctions like chewing and swallowing disturbances and xerostomia. This is associated with the altered pleasure of eating and increased eating time.¹ Subjects having dysphagia usually avoid eating socially and may feel embarrassed while eating in the company of others. Eating problems may not only cause the loss of eating but also eating socially.² The positive aspect of food intake is altered significantly for subjects with Head and neck carcinoma managed by Radiotherapy, as they usually experience difficulties with eating like pain, loss of taste, mouth opening, and chewing.³

The present study assessed 4 cohorts of subjects having Head & Neck carcinoma with an aim to spot subjects needing nutritional support and to upgrade the nutritional surveillance.

Study I was a prospective study that assessed the metabolic and inflammatory markers in subjects with head and neck carcinoma undergoing Radiotherapy.

Study II was conducted to describe the incidence of fatal, severe, and minor complications in subjects having Head and neck carcinoma with PEG nutrition. The study also described the PEG use duration, and the long-term survival rate following PEG tube placement in these subjects, and to evaluate if complication rate is related to the method of PEG tube placement.

Study III assessed subjects with nutrition control in head and neck carcinoma for factors leading to the weight loss including civil status, age, gender, BMI, tumor stage, tumor site, and therapeutic approach. The study also assessed the relationship between weight loss and postoperative infection and mortality during radiotherapy in subjects with head and neck carcinoma following 2 years of radiotherapy termination.

Study IV prospectively interviewed life influence by feeding (PEG/NGT) or disease in head and neck carcinoma subjects from diagnosis to 3 months following radiotherapy termination. This study evaluated the subject's views on Overall quality of life (QoL), and aspects of life affected by the disease, having enteral nutrition or oral feeding, and the feeding tube (NGT or a PEG tube).

MATERIALS AND METHODS

The present study was conducted at Shyam Shah Medical College And Sanjay Gandhi Memorial Hospital, Rewa, Madhya Pradesh after obtaining clearance from the concerned Ethical committee. The study included the subjects with any affected site with head and neck carcinoma including ear, salivary glands, larynx, hypopharynx, oropharynx, nasopharynx, sinuses, nose, oral cavity, and lip. The study population was comprised of the subjects visiting the Department of Otolaryngology and Head and Neck Surgery of the institute.

For study I: Following the screening of 52 subjects, only 23 finally agreed and were fulfilling the inclusion criteria. The subjects were included following diagnosis for Head and neck cancer and were planned for Radiotherapy. Exclusion criteria included psychiatric disorder/dementia, secondary malignant disease, severe alcoholism, diabetes mellitus, and 5% weight loss at diagnosis before therapy.

For study II: 150 subjects with head and neck carcinoma requiring PEG during the study period were retrospectively assessed for PEG insertion complications. PEG tube was indicated for advanced tumor stage with expected nutritional problems, 5% or more bodyweight loss, and with swallowing disorders.

For study III: 146 subjects with nutrition control in head and neck carcinoma for factors leading to the weight loss.

For study IV: Study subjects were prospectively interviewed concerning life influenced by feeding (PEG/NGT) or disease in head and neck carcinoma subjects.

Collection of the Data

In study I: From diagnosis to 4 weeks after radiotherapy termination, weight loss and oral mucositis were assessed following the WHO scale for acute and subacute toxicity, and non-fasting blood samples were collected serially. The assessments were performed at pre radiotherapy, 3 weeks of Radiotherapy, at radiotherapy end, and within 2-4 weeks after radiotherapy termination.

Metabolic and inflammatory parameters assessed in serum were ghrelin (affecting appetite and body weight), IGF-1 (age-dependent, decrease with increasing age), albumin (normal range: 35-48g/L), and hsCRP (highly sensitive C-reactive protein) with normal range: <2mg/L.

In study II: Medical records constituted as the data. The subjects were retrospectively assessed from diagnosis to study end or until death. The parameters assessed related to PEG were: complications, survival after PEG tube placement, PEG at time of death, PEG duration, PEG indication, type of PEG method, PEG related to RT and surgery, date of PEG insertion, surgery, Radiotherapy, TNM staging, and classification.

In study III: Bodyweight and BMI were collected from the first visit to 2 years following radiotherapy termination. Weight was assessed at the first diagnostic endoscopy, at radiotherapy start, 2 weeks of radiotherapy, 4 weeks of radiotherapy, end of radiotherapy, 1 month following radiotherapy, at surgery, 6 months after radiotherapy termination, and 1-2 years after radiotherapy. Additionally, nutrition information was collected including no enteral/enteral nutrition and nutritional support about the treatment.

In study IV: Quality of Life was assessed using SEIQoL-G (Generic), SEIQoL-DR (Disease-related), and SEIQoL-EN (Enteral Nutrition). The interview of the subjects was done at the start of the radiotherapy(T1), 2 weeks following radiotherapy (T2), and 3 weeks following radiotherapy (T3). The questions were focused on change in their life positively/negatively after starting the treatment of cancer and positive/negative influence after feeding tube, either PEG or NGT. Demographic characteristics and clinical data were also collected.

In study I, subjects were divided into 3 groups based on their weight loss from preoperative loss and were assessed. In study II, PEG complications and methods were evaluated and divided into minor, severe, and fatal groups. Subjects of the fatal group died either due to PEG complications or placement method. In study III, data was assessed based on therapy and outcomes, where radiotherapy was either used as a single intervention or combined with the surgery. The data were analyzed using one-way ANOVA for weight loss. In study IV, interviews were conducted at all time intervals to assess the difference between groups.

RESULTS

Study I: All 23 study subjects lost weight during the Radiotherapy. Bodyweight seen was lowest at the end of Radiotherapy. It was seen that 3 subjects lost <5% weight, 13 subjects lost 5-10% body weight, and 7 subjects lost >10% body weight during Radiotherapy. 20 subjects needed enteral nutrition, whereas, all subjects showed mucositis at radiotherapy termination. At all time intervals, T1, T2, and T3, minor changes in ghrelin, IGFBP-1, and IGF-1 were seen, albumin concentration reduced by 18.4% after radiotherapy. The values of hsCRP showed a significant increase during radiotherapy and decreased significantly during recovery. However, hsCRP levels did not return to the preoperative values. The maximum mean hsCRP was 35.6 ± 8.7 mg/l compared to 5.4 ± 1.2 mg/l at diagnosis. This was statistically significant ($P < 0.01$). >40mg/l hsCRP was seen in 8 study subjects. Mucositis and weight loss were not related to hsCRP levels. Also, weight loss was not related to mucositis or albumin. Metabolic markers assessed were not predictive for IGFS or weight loss.

Study II: PEG tube was placed in 150 study subjects. In 79.33% (n=119) subjects, a stage III/IV tumor was seen. In 95.33% (n=143) subjects, radiotherapy was given. Method of PEG placement was push technique in 0.66% (n=1) subjects, pull method in 38.66% (n=58) subjects, and introducer technique in 60.66% (n=91) study subjects. Concerning complications seen in 56 subjects, it was seen that minor complications were seen in 14% (n=21) subjects, severe complications in 20% (n=30) subjects, and fatal complication in 3.33% (n=5) study subjects. All 5 subjects with fatal complications, one subject died due to paralytic ileus, 3 with GI bleeding, and one with necrotizing fasciitis. All subjects with fatal complications died (Table 1).

Study III: Among 146 study subjects, 39 subjects received single radiotherapy and 109 study subjects received combined surgical and radiotherapy treatment. Of 39 subjects with radiotherapy, 4 showed complete response, and of 109 subjects receiving combined treatment, 102 subjects had no microscopic tumor. Both radiotherapy and combined therapy subjects had increased body weight from radiotherapy start to 2 weeks following termination.

This was followed by a decrease in weight which was maximum at 6 weeks termination. More weight loss was seen in the combined group compared to the radiotherapy alone group. 19.5% variance was seen.

Study IV: Study subjects were divided into two groups, the subjects who can maintain oral feeding (n=17) and subjects on enteral nutrition (n=22). Among subjects on enteral nutrition, 15 subjects were given PEG and 7 subjects received NGT. After 3 months, no significant difference in weight loss was seen in study subjects. Weight loss in the PEG group was 6.1% whereas in the NGT group was 9.4%. 13 categories in SEIQoL were used to assess the quality of life. The most commonly affected area was interest, personal health, and family relation. Minor and major complications were evaluated in Table 2.

DISCUSSION

The present study was conducted to study different patient cohorts and identify the subjects of head neck and neck cancer requiring nutritional support. Also, the present study was aimed at improving the nutritional surveillance in such subjects. All subjects received nutritional counseling and were informed about the importance of high-caloric intake in maintaining body weight Radiotherapy. Most of the subjects gained weight before the Radiotherapy started. Despite this support with nutritional counseling, almost all subjects of study I, III, and IV had body weight loss during and after treatment.

In study I, all 23 study subjects lost weight during the Radiotherapy. Bodyweight seen was lowest at the end of Radiotherapy. It was seen that 3 subjects lost <5% weight, 13 subjects lost 5-10% body weight, and 7 subjects lost >10% body weight during Radiotherapy. 20 subjects needed enteral nutrition, whereas, all subjects showed mucositis at radiotherapy termination. At all-time intervals, T1, T2, and T3, minor changes in ghrelin, IGFBP-1, and IGF-1 were seen, albumin concentration reduced by 18.4% after radiotherapy. The values of hsCRP showed a significant increase during radiotherapy and decreased significantly during recovery. However, hsCRP levels did not return to the preoperative values. The maximum mean hsCRP was 35.6 ± 8.7 mg/l compared to 5.4 ± 1.2 mg/l at diagnosis. This was statistically significant ($P < 0.01$). >40mg/l hsCRP was seen in 8 study subjects. Mucositis and weight loss were not related to hsCRP levels. Also, weight loss was not related to mucositis or albumin. Metabolic markers assessed were not predictive for IGFS or weight loss. This was in agreement with the studies of Ferlay J et al⁴ in 2010 and Eades M et al⁵ in 2009 where authors showed comparable values of hsCRP in their subjects.

In study II, a PEG tube was placed in 150 study subjects. In 79.33% (n=119) subjects, a stage III/IV tumor was seen. In 95.33% (n=143) subjects, radiotherapy was given. Method of PEG placement was push technique in 0.66% (n=1) subjects, pull method in 38.66% (n=58) subjects, and introducer technique in 60.66% (n=91) study subjects. Concerning complications seen in 56 subjects, it was seen that minor complications were seen in 14% (n=21) subjects, severe complications in 20% (n=30) subjects, and fatal complication in 3.33% (n=5) study subjects. All 5 subjects with fatal complications, one subject died due to paralytic ileus, 3 with GI bleeding, and one with necrotizing fasciitis. All subjects with fatal complications died. These findings were consistent with the results of Koc M et al⁶ in 2003 and Ki Y et al⁷ in 2009 where authors reported comparable complications in their studies following enteral nutrition.

In study III, among 146 study subjects, 39 subjects received single radiotherapy and 109 study subjects received combined surgical and radiotherapy treatment. Of 39 subjects with radiotherapy, 4 showed complete response, and of 109 subjects receiving combined treatment, 102 subjects had no microscopic tumor. Both radiotherapy and combined therapy subjects had increased body weight from radiotherapy start to 2 weeks following termination. This was followed by a decrease in weight which was maximum at 6 weeks termination. More weight loss was seen in the combined group compared to the radiotherapy alone group. 19.5% variance was seen. These results were comparable to the studies of Levin F et al⁸ in 2006 and McQuestion M et al⁹ in 2011 where comparable body weight pattern was followed by study subjects in their study.

In study IV, Study subjects were divided into two groups, the subjects who can maintain oral feeding (n=17) and subjects on enteral nutrition (n=22). Among subjects on enteral nutrition, 15 subjects were given PEG and 7 subjects received NGT. After 3 months, no significant difference in weight loss was seen in study subjects. Weight loss in the PEG group was 6.1% whereas in the NGT group was 9.4%. 13 categories in SEIQoL were used to assess the quality of life. The most commonly affected area was interest, personal health, and family relation. These results were in line with the results of Larsson M et al¹⁰ in 2003 and Garcia-Peris P et al¹¹ in 2007 where enteral nutrition showed a similar pattern as in the present study.

CONCLUSION

Within its limitations, the present study concludes that adequate assessment of the subjects with head and neck cancer should be adequately assessed before the intervention, and appropriate postoperative care and follow-up are vital to reduce the risk of enteral tube-related complications. NGT should be preferred over PEG owing to it being acceptable, cost-effective, safe, and easy to use in most subjects. Also, it is associated with lesser complications with shorter span use required compared to PEG. PEG is preferred in subjects requiring enteral nutrition for a longer period.

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TABLES

Parameter	Percentage % (n)	Number (n)
Weight loss		
<5%	3	<0.0001
5-10%	13	
>10%	7	
hsCRP		
Preoperative	5.4±1.2	<0.0001
Postoperative	35.6±8.7	

Table 1: Parameters following radiotherapy in the study subjects

Complications	Variables	%	n=56
Minor complications	PEG material problem	16.07	9
	Granulation Tissue	17.85	10
	Microleakage	21.42	12
	Abdominal Pain around PEG	37.5	21
Major complications	Peritonitis	5.35	3
	Major Leakage	8.92	5
	Wound Infection	44.64	25

Table 2: Minor and major complications seen in the study subjects