Eating and Weight Changes Following Chemoradiation Therapy for Advanced Head and Neck Cancer

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Objective: To describe the functional outcomes of weight loss and eating following a targeted chemoradiation protocol consisting of a selective supradose of intra-arterial cisplatin (150 mg/m² per week for 4 weeks) with parenteral sodium thiosulfate and external-beam irradiation (1.8-2.0 Gy per fraction per day for 35 days).

Subjects and Design: Forty-seven patients with advanced head and neck cancer treated with a targeted chemoradiation protocol were monitored for weight and eating status before treatment and as long as 18 months after treatment.

Results: A statistically significant weight loss (P < .001) occurred during the targeted chemoradiation protocol, with a mean weight ratio of 90% of the starting weight. The ability to eat also declined, with an increase in reported swallowing difficulties and a need for percutaneous endoscopic gastrostomy tubes from 4 (9%) to 12 (26%). There were no significant changes in weight after the initial weight loss. Tumor stage and nodal involvement had no effect on weight loss. At the start of treatment, 18 patients (38%) reported normal eating and 4 (8%) required a feeding tube. By 18 months after treatment, 41 (87%) were eating normally, 34 (72%) reported normal eating, and 6 (13%) required a percutaneous endoscopic gastrostomy tube.

Conclusions: Patients undergoing a targeted chemoradiation protocol for head and neck cancer lost about 10% of their pretreatment weight and had a decline in eating ability. Difficulty swallowing during the treatment may be due to adverse effects such as mucositis and nausea. By 18 months after therapy, most were able to eat normally and maintain their weight.


The treatment of head and neck cancer with organ preservation protocols has the potential to spare head and neck structures necessary for swallowing. Changes in swallowing function have been reported in patients undergoing radiotherapy with or without chemotherapy as the primary treatment modality. An average loss of about 10% of pretherapy weight in patients undergoing radiotherapy has been documented. Weight loss has serious consequences for the well-being of patients being treated for head and neck cancer. Patients who lose greater than 10% of their previous body weight are considered to be at risk for malnutrition. A weight loss exceeding 20% may be associated with an increase in morbidity and mortality.

A novel targeted chemoradiation protocol (RADPLAT [radiation plus cisplatin]) for the treatment of advanced head and neck cancer has been shown to be effective in organ preservation, a high rate of response, and a potentially improved prognosis for survival. This protocol consists of the concurrent administration of a selective supradose intra-arterial cisplatin (150 mg/m² per week for 4 weeks) with parenteral sodium thiosulfate for neutralization and conventional external-beam irradiation (1.8-2.0 Gy per fraction per day for 35 days).

The protocol RADPLAT has the potential to be an important management scheme for patients with a devastating disease. It is important to understand the adverse effects of RADPLAT, including weight loss and the inability to eat. Following the completion of this treatment, patients need to know the prognosis for gaining weight and eating orally. The purpose of this study is to report weight main-
PATIENTS AND METHODS

Patients undergoing RADPLAT treatment were required to sign an informed consent document approved by the Institutional Review Board of the University of Tennessee, College of Medicine, Memphis. Eighty-three patients were enrolled in the RADPLAT protocol from June 1993 to December 1994 for the treatment of advanced head and neck cancer. Of the 83 patients, 36 were excluded from the study for the following reasons: unavailable for follow-up (2 patients), did not complete treatment (8 patients), died of distant metastasis (15 patients), died of other causes (7 patients), had regional recurrence (2 patients), and had local recurrence (2 patients).

A total of 47 patients with a complete response, free of disease, and available for follow-up were monitored for weight and the ability to eat. The group comprised 13 women (28%) and 34 men (72%). The mean (±SD) age was 56.5 (± 10.7) years, with an age range of 38 to 83 years. Patient profiles of tumor-stage classification, site of tumor, and nodal involvement are given in the Table.

Weight loss was measured by weighing patients before the treatment, at the end of treatment, and at 6, 12, and 18 months after the treatment. A ratio of weight loss comparing the weight after treatment divided by the weight before treatment was computed at the end of treatment and at 6, 12, and 18 months after the treatment.

Eating ability was assessed at the same time as weight before and after the RADPLAT protocol. Four categories were used to describe eating ability: (1) normal or nearly normal swallowing; (2) impaired swallowing requiring dietary alterations; (3) recreational oral intake (dependent on tube feeding for nutrition and eating occasionally by mouth) possible, but tube feeding necessary for daily nutritional requirements; and (4) entirely dependent on tube feeding.

Statistical analyses were done to compare weight ratios and the reported eating ability before and at various points after treatment. Weight loss and eating ability were described by measures of central tendency. A repeated-measures analysis of variance was used to compare weight changes before and after the RADPLAT protocol. Analyses of variance or the Student t test was used to assess the effects of tumor-stage classification, eating ability, nodal involvement, and percutaneous endoscopic gastrostomy (PEG) tube placement on weight loss. The relationship between the tumor stage and nodal involvement on eating ability was analyzed before and after the treatment with a χ² test. A P value of .05 or less was considered significant. The small number of subjects for the various tumor sites was not adequate for analyzing the effects of the tumor site on weight loss and eating ability.

<table>
<thead>
<tr>
<th>Category</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site of tumor</td>
<td></td>
</tr>
<tr>
<td>Hypopharyngeal (pyriform sinus)</td>
<td>6 (13)</td>
</tr>
<tr>
<td>Laryngeal</td>
<td>14 (30)</td>
</tr>
<tr>
<td>Oral cavity*</td>
<td>4 (9)</td>
</tr>
<tr>
<td>Oropharyngeal†</td>
<td>23 (49)</td>
</tr>
<tr>
<td>Tumor stage‡</td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>4 (9)</td>
</tr>
<tr>
<td>T3</td>
<td>19 (40)</td>
</tr>
<tr>
<td>T4</td>
<td>24 (51)</td>
</tr>
<tr>
<td>Nodal involvement</td>
<td></td>
</tr>
<tr>
<td>N0</td>
<td>19 (40)</td>
</tr>
<tr>
<td>N1</td>
<td>7 (15)</td>
</tr>
<tr>
<td>N2a</td>
<td>4 (9)</td>
</tr>
<tr>
<td>N2b</td>
<td>8 (17)</td>
</tr>
<tr>
<td>N2c</td>
<td>6 (13)</td>
</tr>
<tr>
<td>N3</td>
<td>3 (6)</td>
</tr>
</tbody>
</table>

*The following sites were involved: tongue (2 patients), retromolar trigone (1 patient), and floor of mouth (1 patient).
†The following sites were involved: tonsill (10 patients), base of tongue (9 patients), and pharyngeal wall (4 patients).
‡From the TNM classification of the American Joint Committee on Cancer.

RESULTS

Weight changes and eating ability were monitored in 47 patients. Before the initiation of the RADPLAT protocol, 18 patients (38%) reported normal swallowing, 25 (53%) reported impaired swallowing, and 4 (9%) were eating recreationally and dependent on tube feedings. There was a significant relationship between the ability to eat and the tumor-stage classification (Figure 1). Patients with T4 lesions were more likely to report normal eating than patients with T3 lesions and were the only patients to have a PEG tube.

Posttreatment weight loss 18 months following treatment can be seen in Figure 2. Repeated-measures analysis of variance revealed a significant weight loss (P ≤ .001) during the RADPLAT treatment, with a mean (± SD; range) weight loss of 10% (± 6%; 78%-102%) of initial body weight. There were no significant changes in weight following the initial weight loss. There was no relationship between weight loss and tumor-stage classification or nodal involvement.

The subjects’ reported ability to eat before and after treatment, as related to the 4 eating categories, is shown in Figure 3. The percentage of patients who reported normal swallowing declined during the RADPLAT treatment from 38% (18 patients) to 21% (10 patients) and increased during the next 18 months to 72% (34 patients). This decline in swallowing ability during the treatment is further demonstrated by the number of PEG tubes used.
At the start of chemoradiation treatment (RADPLAT), more than half of the patients reported difficulty swallowing. Patients often lose weight before the diagnosis or treatment of head and neck cancer. This study did not examine pretherapy weight loss.

The results of this study demonstrated that patients who underwent RADPLAT treatment of advanced head and neck cancer lost about 10% of their pretherapy body weight during the treatment. This weight loss for patients undergoing the RADPLAT treatment was consistent with reported weight loss for radiotherapy alone. At the same time, patients had greater difficulty swallowing, manifested by increased symptoms and a greater necessity for feeding tubes (PEGs). Weight loss and eating difficulties may be due to the adverse effects of chemoradiation therapy, specifically nausea and mucositis causing odynophagia.

The prognosis for weight management and eating ability greatly improves in the first 18 months following the completion of the RADPLAT treatment. In this study, patients maintained their weight, and swallowing function recovered. Specifically, half of the patients with feeding tubes were able to resume complete oral nutrition. Most patients (34 [72%]) reported normal swallowing 18 months after treatment, representing a dramatic improvement from the 18 patients (38%) who reported normal swallowing at the start of treatment. The initial tumor stage had an effect on eating ability before RADPLAT therapy, and patients with T4 tumors were more likely to have a PEG tube. After the RADPLAT treatment, patients with T4 tumors did as well as patients with smaller lesions.

Two posttreatment trends in the improvement in swallowing were noted in this study. Patients who ate orally at 6 months showed progressive improvement at 12 and 18 months, with an increased percentage of those who reported normal swallowing. Patients who had a PEG tube at 6 months (half of those with a PEG tube at the completion of RADPLAT therapy) were likely to have a PEG tube at 12 and 18 months. The data from this study suggest that the act of eating and swallowing may rehabilitate the oropharyngeal musculature necessary for swallowing.

Further research needs to focus on 2 issues. First, the swallowing function must be examined to determine how the RADPLAT treatment affects oral, pharyngeal, and cervical esophageal function. Second, the results of swallowing, eating ability, and weight maintenance in patients undergoing the RADPLAT treatment need to be compared with other chemoradiation regimens.

**COMMENT**

**Figure 1.** Eating ability in patients with advanced head and neck cancer with respect to tumor-stage classification before the start of chemoradiation therapy. White bars indicate patients with normal or near-normal swallowing; black bars, those with impaired swallowing requiring dietary alterations; and black-bordered bar, those with recreational oral intake plus tube feeding.

**Figure 2.** Mean (± SD) percentages of weight loss in patients after completing chemoradiation therapy for advanced head and neck cancer.

**Figure 3.** Eating ability before and after chemoradiation therapy for patients with advanced head and neck cancer.
The RADPLAT protocol was initially designed to treat unresectable T3 and T4 tumors. Its use has been expanded for patients who prefer an organ preservation protocol as an alternative to surgical ablation. Following oral and pharyngeal surgical resections, patients demonstrate substantial functional impairment of swallowing,8,10 which does not improve for at least the first year after surgical treatment.10 The results of this study indicate that the low incidence of PEGs and high incidence of normal eating is a favorable outcome for the RADPLAT protocol.

The ability to eat is an important factor contributing to the quality of life after the treatment of advanced head and neck cancer. After the completion of the RADPLAT protocol, most patients (41 [87%]) undergoing the RADPLAT treatment ate orally and most (34 [72%]) ate normally and maintained their weight.

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REFERENCES