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Nutritional Management for Head and Neck Cancer Patients


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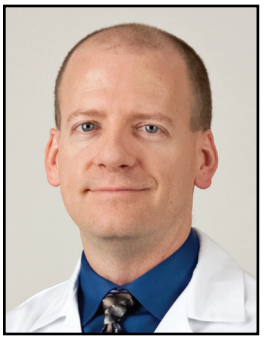
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Patients with head and neck cancer face unique challenges in maintaining adequate nutrition. Both the disease itself and the treatments, especially surgery and radiation therapy, have significant negative impact on upper digestive tract function, and oral intake is often insufficient during and after therapy. Placement of gastrostomy tubes is the most common approach to ensuring safe delivery of adequate nutrition, but the optimal timing remains unclear. Prophylactic (pretreatment) gastrostomy tube placement is commonplace, but there is a lack of evidence to support this practice for all patients. Much work has been done with respect to improvement of functional recovery from dysphagia, which includes rigorous "exercise" programs that show great promise. A diverse and experienced patient care team is needed to produce the best outcomes.

HEAD AND NECK CANCER

In the United States in 2013, oral cavity, pharynx and larynx cancers are projected to account for 3.2% of all new cancers.[1] The vast majority of these are head and neck squamous cell carcinoma (HNSCC). In addition to survival, quality of life and functional outcomes have become paramount. Thus, much more attention has been paid to the necessity of maintaining good nutrition, both during and after treatment, and there has been a greater recognition of the unique challenges for nutritional management. Weight loss during treatment for HNSCC is a major concern; substantial weight loss in 75-80% of patients has been widely reported.[2] While these obstacles are often due to the cancer itself, the common treatments for HNSCC, including surgery, radiotherapy (RT), and chemotherapy, also lead to changes that further complicate and challenge oral intake.[2,3]

Surgery, depending on the tumor site, procedure, and approach, may significantly alter the anatomy and lead to scarring that negatively impacts swallowing

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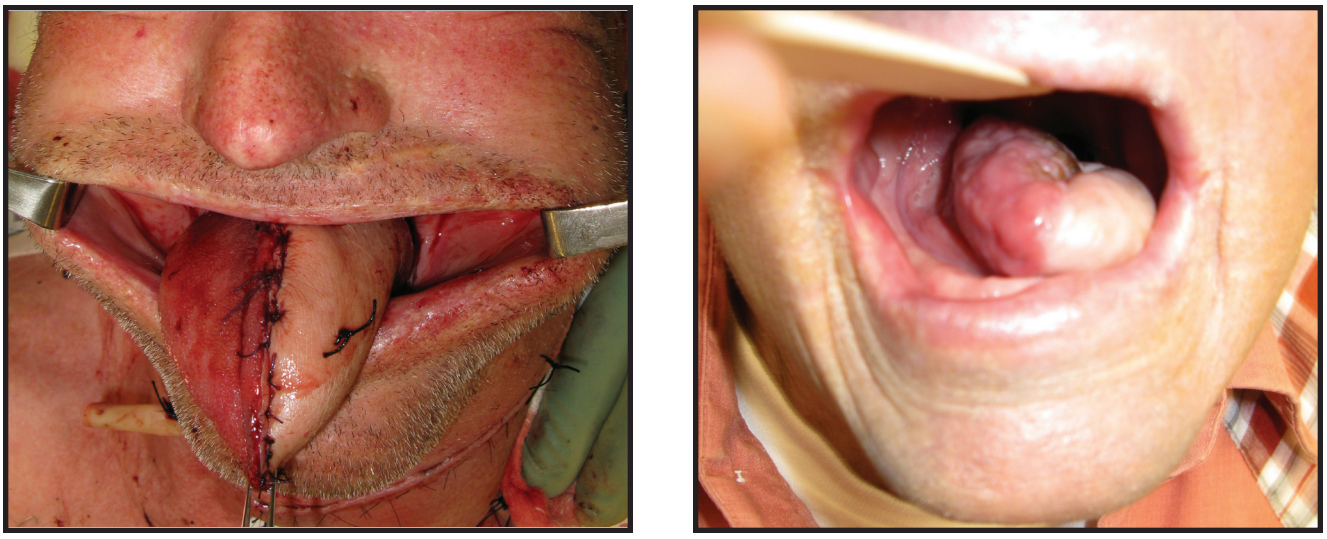

Figure 1. Hemiglossectomy Reconstruction. A patient with left lateral tongue SCC underwent primary surgical resection via hemiglossectomy and reconstruction with a radial forearm free flap.
Left: Intraoperative photo immediately after completion of reconstruction. **Right:** Two month postoperative photo.

function and airway protection. Additionally, patients are likely to be restricted from oral intake while the surgical site heals. After minor oral cancer resections, patients may begin eating in the immediate postoperative period, but patients at higher risk for fistula formation will be kept NPO for days to weeks. Postoperative pain generalized to the pharynx may limit oral intake as well. Current strategies for advanced head and neck reconstruction often involve free tissue transfer in an effort to optimally restore form and function, e.g., use of radial forearm fasciocutaneous free flap for tongue reconstruction (Figure 1) or fibula osteomyocutaneous free flap for oromandibular reconstruction. With time, these approaches allow for more natural function, but they require enteral nutrition (EN) while healing occurs. While the goal is eventual dependence on oral feeding for nutrition, some patients will always require enteral support due to the structural and sensory deficits, and others will develop enough scarring to impair function even after returning to oral feeding.

A unique postoperative situation occurs in patients undergoing total laryngectomy (TL). After removal of the larynx, the trachea terminates at the skin (called the "tracheostoma") and the pharynx is closed primarily (termed the "neopharynx"). No air moves through the mouth or nose, thus no speech is possible. This is overcome by a tracheoesophageal puncture (TEP), which creates a fistula from the back wall of the upper trachea into the cervical esophagus. Ultimately, a voice prosthesis with a one-way valve in this fistula will allow the patient to produce speech by diverting air from the trachea into the neopharynx (the vibratory source) and mouth on exhalation. While some surgeons place the voice prosthesis at the time of the TL when the TEP is performed, many place a feeding tube through the puncture into the stomach. This "stomogastric" tube serves as both a stent and a route for EN while the neopharynx heals; it is generally replaced by the voice prosthesis via a simple office procedure when healing is deemed adequate and the patient demonstrates the ability to swallow (about 2-3 weeks after the operation). All TL procedures are at risk for pharyngocutaneous fistula formation which further delays oral intake postoperatively while the fistula is managed; this risk is substantially higher in patients who have previously undergone RT.

One of the most-studied treatment approaches for HNSCC is organ-sparing therapy. This refers to the avoidance of surgical resection and involves RT alone or in combination with chemotherapy (CRT). This treatment approach preserves anatomic structures and generally results in better speech than surgical removal, but often produces more impaired swallowing function. RT for HNSCC is generally administered 5 days per week for 6-7 weeks at about 2 Gy per day (10 Gy per week). Treatment impact, including side effects, escalates with time and continues to evolve well beyond

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the completion of therapy. Acute tissue reactions exhibit a dose response. Dysgeusia is a common early side effect. Erythema of the skin and mucosa develop at approximately 20 Gy, and mucositis, dermatitis and decreased salivary flow begin at 30-40 Gy. Acute dermatitis and oropharyngeal mucositis usually resolve within 1-2 months of treatment, while taste alterations may persist for several additional months, or indefinitely. Xerostomia may also persist. Radiation damage occurs in all tissue types in the field, and fibrosis is common. RT reduces pharyngeal and esophageal pliability, and can cause stenosis and strictures, in addition to muscular atrophy and cranial neuropathy. Despite advancements in RT techniques, dysphagia remains a common complication. RT-related dysphagia may develop months or years after therapy and can result in permanent and severe dysfunction necessitating chronic EN.[4-6] Chemotherapy enhances the negative effects of radiation. Additionally, chemotherapy causes nausea and vomiting and reduces the desire to eat. Thus, the use of EN has become commonplace, if not ubiquitous, in patients needing therapy for HNSCC.

Nutritional Status

Almost all patients with HNSCC are malnourished at the time of diagnosis. While this is due in part to malignancy-induced metabolic changes, dysphagia is a hallmark of HNSCC; it occurs as a result of mechanical obstruction, sensory impairment, odynophagia and/or trismus.[2] There is a high prevalence of alcohol abuse and long-term tobacco use in this population, which are also associated with chronic malnutrition.

Despite the high frequency of pretreatment malnourishment, there has been limited investigation into the value of delaying treatment until adequate nutritional status has been achieved. This is most likely due to concerns over allowing tumors to progress in already symptomatic patients, particularly given the risk of airway compromise. The delayed treatment approach has been utilized in other cancer types in order to improve the chances of treatment success and warrants further study in HNSCC. Good nutritional status is known to enhance therapy completion rates, oncologic survival, and post-treatment quality of life (QOL) for all types of cancer therapy.[2]

Approach to Enteral Feeding

When managing nutrition support of a patient with head and neck cancer (HNC), gastrostomy (G) tubes are considered the best option unless EN will be for less than a few weeks. Percutaneous endoscopic gastrostomy (PEG), surgically-inserted (open/laparoscopic) gastrostomy (SIG) and radiologically-inserted gastrostomy (RIG) were compared in a randomized controlled trial of HNC patients. While minor complication rates in each group were similar, the rates of serious complications and death were 0%, 10%, and 11%, respectively,[7] dramatically favoring the PEG group. A subsequent systematic review favored PEG over RIG.[8] While NG tubes are generally considered adequate in patients needing less than 28 days of EN, multiple studies have identified significant benefits of PEG over NG tube in patients with HNSCC. Much of this is based on patient discomfort with NG tube and a higher risk of aspiration after NG tube placement.[9,10] However, a Cochrane Review did not find sufficient evidence to determine superiority among NG, PEG, SIG or RIG tubes.[2] Note was made of greater weight loss early in treatment in patients with NG tubes, but this did not persist at 6 months after treatment. The PEG tube group demonstrated increased duration of enteral feeding and 10 times greater cost.[2] As described above, a stomogastric tube provides a unique mode of enteral access after TL. It should also be noted that, in patients who require short-term EN after oral, pharyngeal, or laryngeal surgery, but have no enteral access, an NG tube should not be placed without consulting the surgeon involved, as this may place the patient at risk for disruption of the closure and subsequent wound complications and feeding delay.

Placement of a PEG tube by the standard pull-through method can be difficult or impossible in large, obstructive cancers or when a patient has significant pharyngeal or esophageal stenosis due to the tumor or prior therapy. However, as new methods are developed, these limitations are being overcome. One such method is the direct method, which utilizes a 5.0 mm diameter micro-endoscope to visualize the site of insertion followed by direct introduction of the PEG tube into the stomach. In 160 patients with upper aerodigestive tract cancers, 158 (98.8%) PEG tubes were successfully inserted using this method, which compares favorably with a reported success rate of 92.5% for traditional techniques. Also, there were no instances of gastrostomy site metastasis in this population, which has been reported when using a standard approach.[11] In our experience, almost all

Table 1. National Comprehensive Cancer Network (NCCN) Guidelines for Nutrition in Head and Neck Cancer Patients.[14]

Global Nutrition Recommendations for patients receiving (chemo-)radiotherapy

- Utilize oral intake as much as possible while maintaining safety
- Monitor for the lifetime of the patient even well after therapy

Factors predicting limited enteral feeding requirement

- Very good performance status as measured by the Eastern Cooperative Oncology Group (ECOG/WHO/Zubrod) score
- No significant…
  - Pre-treatment weight loss
    - 5% past 1 month
    - 10% past 6 months
  - Airway obstruction
  - Dysphagia

Factors suggesting strong consideration of prophylactic PEG

- Severe weight loss prior to treatment
  - 5% past 1 month
  - 10% past 6 months
- Symptoms include…
  - Ongoing dehydration
  - Severe dysphagia
  - Anorexia
  - Odynophagia interfering with oral intake
- Significant comorbidities requiring good oral intake for health maintenance
- Severe aspiration in any patient
- Any aspiration in an elderly patient or patients with compromised cardiopulmonary function
- Patients anticipating high-dose radiation

patients with HNSCC can undergo PEG placement using the standard approach; in difficult cases (e.g., large obstructing tumor), assistance from an experienced head and neck surgeon to guide the endoscope and/or displace the tumor can be invaluable. In the very limited number of patients who cannot undergo pull-through PEG placement, we pursue laparoscopic G-tube insertion, which has very low morbidity.

A predictive model would be useful to avoid excessive use of G-tubes. In a study by Jack *et al.*, only patients with small primary tumors and near-normal preoperative diet who did not require postoperative RT were suitable candidates for NG tubes.[12] When evaluated by Wermker *et al.*, key predictors for PEG tube placement were lower BMI, larger tumor size, greater lymph node involvement, and floor of mouth or base of tongue tumors.[13] The current recommendations of the National Comprehensive Cancer Network (NCCN) regarding the use of G-tubes in patients with HNC are shown in Table 1.[14]

Timing of Enteral Support

One potential benefit of newer G-tube placement methods is to limit the need to prophylactically place a PEG tube prior to beginning treatment of HNSCC, but the issue of timing of G-tube placement remains controversial. Several studies have sought to determine the value, if any, of prophylactic PEG tube insertion

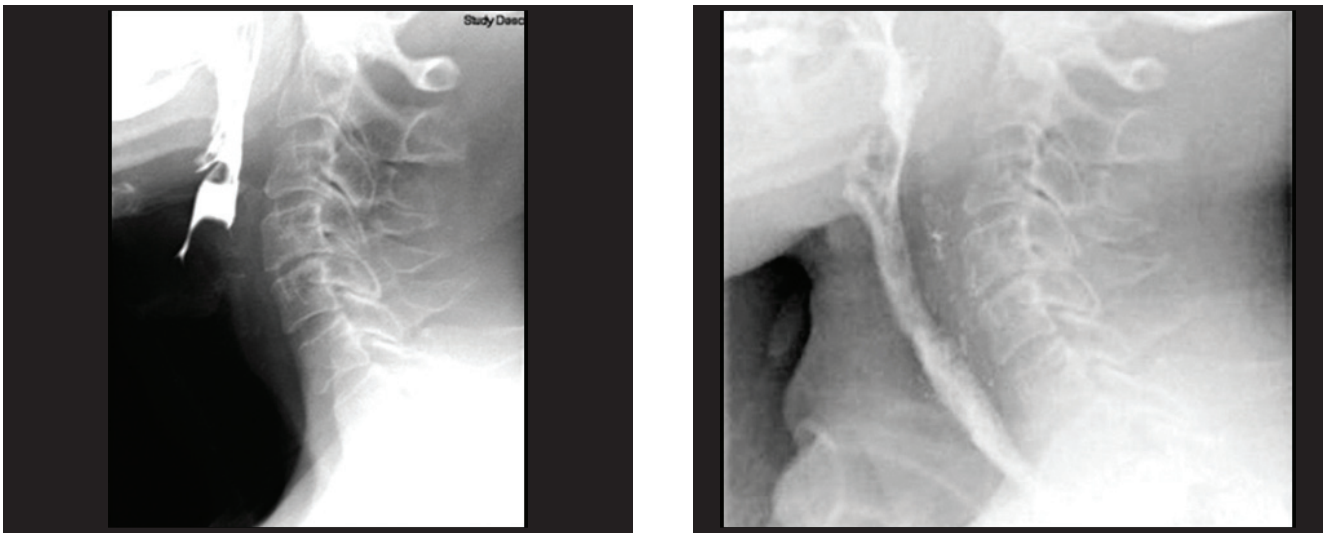

Figure 2. Total Pharyngeal Reconstruction. A patient with total pharyngeal stenosis after CRT for oropharyngeal SCC underwent total laryngopharyngectomy and pharyngeal replacement with a tubed radial forearm free flap.

Left: Preoperative modified barium swallow showing total pharyngeal obstruction.

Right: Postoperative modified barium swallow showing widely patent neopharynx.

compared to symptom-based (therapeutic) placement, which is based on problematic dysphagia or malnutrition. Silander *et al.* conducted a randomized trial to evaluate oral intake, weight loss, QOL, and other parameters in patients who underwent prophylactic PEG tube placement vs. patients who underwent symptomatic nutrition management with therapeutic NG or PEG tube or no enteral support. QOL scores were generally better in the prophylactic group than in the symptomatic group, particularly at 6 months. During the first 12 months the number of malnourished patients (defined as greater than 10% weight loss compared to diagnosis) was slightly higher in the symptomatic group, but after 1 year the groups were similar. The prophylactic group used EN for an average of 177 days, significantly longer than the symptomatic group, who averaged 122 days. Patients with a prophylactic PEG started using EN earlier and had decreased rates of oral intake during the first year.[15,16]

Despite the lack of definitive evidence in favor of prophylactic PEG insertion, it has become common practice in many centers for patients with HNSCC prior to chemotherapy or RT. A recent study of patients undergoing CRT for advanced cancers found that 60% of patients underwent PEG tube placement, almost all prophylactically, and these remained in place a median duration of 9 months; 80% and 40% were still dependent on EN at 6 and 12 months, respectively .[17] It is unlikely that all patients need prophylactic G-tube placement, as many can progress through treatment relying on oral nutrition, and, for patients with HNSCC, continuing oral intake as long as possible may be beneficial.

A "use-it-or-lose-it" theory has been proposed that reasons that long-term swallowing function will be better in patients who maintain oral intake as long as possible. However, patients who can obtain adequate nutrition from a G-tube may tend to avoid oral intake due to discomfort and reduced desire to eat during treatment. A retrospective review by Langmore *et al.* compared patient progress after completion of RT for patients treated with a prophylactic PEG vs. patients treated with a therapeutic PEG or no enteral support.[18] At each time point - before RT, at completion of RT, and 3, 6 and 12 months following RT - there was no significant difference in weight change between the two groups. There were, however, significant differences in "diet level" (a score used as an indicator of functional swallowing/dysphagia) at 3, 6 and 12 months after RT: patients with prophylactic PEG tubes had consistently worse diet levels. If the patients were assessed by the amount of oral nutrition (complete, partial, or none), patients who maintained a complete or partial oral diet had better diet levels at 1 year after treatment than patients who relied completely on their PEG tubes.[18] These results, which would seem to suggest

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that the prophylactic PEG group fared worse with respect to the diet level and swallowing ability, are not unexpected; however, this was a retrospective study and the placement of a G-tube prophylactically was not randomized, thus the groups differed on several important variables. The disease stage of all patients who received a prophylactic PEG was III or IV, while 30% of the no-PEG/therapeutic PEG group were stage I or II. Also, 93% of the prophylactic PEG group received chemotherapy in comparison to only 69% of the no-PEG/therapeutic PEG cohort. There were also differences in location of the primary tumor.[18] Thus, the results of this study may simply reflect fundamental differences in the disease characteristics of the two groups. However, our subjective experience is that long-term swallowing function is better when patients continue oral intake through most or all of their RT, and that this period is extended when a PEG is placed symptomatically rather than prophylactically. This approach must be balanced with the individual patient's level of motivation and sense of frustration and anxiety regarding nutritional maintenance during treatment.

Functional Outcomes & Rehabilitation

Treatment of dysphagia is likely to improve QOL, nutritional status and tolerance of therapy.[19] The impact of dysphagia can be evaluated and monitored using the M.D. Anderson Dysphagia Inventory (MDADI), which has demonstrated a greater degree of swallowing-related disability in patients with oral cavity or oropharynx primaries compared to laryngeal or hypopharyngeal primaries.[19] In addition to more objective measurements by speech-language pathologists, the MDADI assesses the patient's swallowing-related QOL, particularly in regard to social function, and may impact clinical decision-making.

Aggressive prophylactic swallowing therapy is a recent development in the treatment of dysphagia in patients with HNSCC. Again based on the "use-it-or-lose-it" concept, this approach focuses on maintaining or regaining function rather than simply accommodating dysfunction (e.g., reliance on soft diet or G-tube, etc.) and allows patients to progress carefully with oral intake despite imperfect swallowing. While this poses some aspiration risk, the benefits may include significant improvements in long-term swallowing outcomes. Multiple therapeutic techniques are being evaluated with very limited data published to date, but the early results suggest long-term improvement in the swallowing function of patients undergoing RT when prophylactic swallowing exercises are employed.[20,21]

While prevention of dysphagia is an important goal, many patients with HNSCC will still suffer significant swallowing difficulty after treatment. In managing post-treatment dysphagia, it is important to confirm the absence of recurrence and to distinguish between functional and anatomic causes, as some anatomic limitations can be corrected. For example, strictures can be dilated under fluoroscopic or endoscopic visualization. When complete luminal obstruction occurs and a G-tube is present, the recently described TREAD procedure (transgastric retrograde esophagoscopy with anterograde dilation) can be employed.[20] When minor procedures fail, surgical resection with advanced reconstruction can be performed (Figure 2).

Established dysphagia that is functional in nature can be difficult to address. Traditional swallow therapy utilizes facilitory techniques, compensatory strategies, and various therapeutic maneuvers to enhance the safety of swallow function. The McNeill Dysphagia Therapy Program is an innovative method that uses more structured and higher frequency sessions than the more commonly used biofeedback approach, and is applicable to swallowing dysfunction of neurologic or oncologic etiology. Using this program on patients including HNC patients, discontinuation of EN was achieved in 67% of patients compared to 27% of patients treated with standard methods. The McNeill method has even proven valuable in patients with chronic dysphagia who have failed multiple other intervention attempts.[23,24]

Implications for Patient Care Team

When providing care for patients with HNC, the importance of a complete and experienced interdisciplinary team cannot be overstated. These cancers are heterogeneous and unique from patient to patient, and they often have a devastating impact. Several factors compete with the goal of immediately improving nutrition, such as time to cancer therapy treatment and quality of long-term function. These issues can only be effectively addressed by teams that have substantial patient volume and thus vast experience. Coordinated effort of the entire team is needed in order to achieve the best outcomes. In addition to nutrition, the non-treatment aspects of well being such as physical activity, emotional support, etc. are consistently being correlated with survival, QOL and other metrics.[25-27]

Emphasis on these areas will likely continue to increase as supporting data are added to the literature.

CONCLUSIONS

Nutrition management is an essential part of the care of patients with HNC. The evolution of care to include QOL as a primary treatment outcome demands a careful patient-centered approach with consideration to long-term functional results in addition to immediate nutritional parameters. While great progress has been made in the use of alternative feeding methods for patients unable to tolerate oral intake, there is still significant progress to be made in the area of dysphagia prevention and treatment, which is a key factor in QOL. A highly experienced and well-coordinated team that spans all related disciplines provides the best opportunity for high quality care of these patients and, ultimately, optimal outcomes. ■

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