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REVIEW ARTICLE

The provision of enteral nutritional support during definitive chemoradiotherapy in head and neck cancer patients

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Abstract

Combination chemoradiation is the gold standard of management for locally advanced squamous cell carcinomas of the head and neck. One of the most significant advantages of this approach to treatment is organ preservation which may not be possible with radical surgery. Unfortunately, few treatments are without side-effects and the toxicity associated with combined modality treatment causes meaningful morbidity. Patients with head and neck cancer (HNC) may have difficulties meeting their nutritional requirements as a consequence of tumour location or size or because of the acute toxicity associated with treatment. In particular, severe mucositis, xerostomia, dysgeusia and nausea and vomiting limit intake. In addition to this, dysphagia is often present at diagnosis, with many patients experiencing silent aspiration. As such, many patients will require enteral nutrition in order to complete chemoradiotherapy (CRT). Feeding occurs via catheters placed transnasally (nasogastric tubes) or directly into the stomach through the anterior abdominal wall (percutaneous gastrostomy tubes). In the absence of clear evidence concerning the superiority of one method over another, the choice of feeding tube tends to be dependent on clinician and patient preference. This review examines key issues associated with the provision of enteral nutritional support during definitive CRT in HNC patients, including feeding methods, patient outcomes and timing of tube insertion and use.

Introduction

Head and neck cancer (HNC) is an umbrella term encompassing 18 distinct cancer subsites as defined by the International Classification of Diseases.[1,2] These cancers are staged according to the Tumour Node Metastases system developed by the International Union Against Cancer (IUCC) together with the American Joint Committee for Cancer (AJCC).[3]

The gold standard of treatment for locoregionally advanced cancers of the nasopharynx and oropharynx is combined modality treatment with concurrent chemotherapy and radiotherapy.[4] This approach is associated with preservation of organ function and decreased rates of distant failure when compared with definitive local treatment with surgery or radiotherapy alone.[5]

The anatomic location of these tumours is often in close proximity to structures vital for breathing, eating and communicating.[6] Patients' inability to meet their nutritional requirements is often exacerbated by treatment-related toxicity.[7] It is therefore preferable that patients be managed in a dedicated HNC unit with multidisciplinary support from speech pathologists, dieticians, nursing and other medical staff.[8]

Patients unable to maintain adequate oral intake have greater rates of weight loss, hospitalisation and forced treatment breaks.[9] Loss of >10% body weight has also been associated with decreased quality of life (QOL).[10,11] Some 40–57% of HNC patients may be malnourished at presentation,[12] with figures increasing to 88% during treatment.[11] Causes are multifactorial, with contributions from patient, treatment and tumour factors. Enteral nutrition (EN), delivered via nasogastric (NG) or percutaneous gastrostomy (PEG) tube, may enable select patients to maintain their weight and minimise toxicity.

The purpose of this review is to explore the key issues surrounding the use of enteral nutritional support (NS) during definitive chemoradiotherapy (CRT) in HNC patients. In the absence of quality randomised data, anecdotal evidence drives individual clinical practice.

Methods

A review of relevant literature was conducted. Articles of interest were identified using Medline, the Cochrane Library, Embase and PubMed databases. Key search terms included 'CRT', 'chemoradiation', 'head and neck neoplasms', 'EN', 'NG tube', 'PEG tube', 'nutrition', 'cachexia', 'dysphagia' and 'QOL'. Reference lists from identified articles were also reviewed.

Articles were eligible for inclusion if they were published prior to November 2014 in English-language journals. Randomised control trials, systematic reviews, retrospective trials, case series and evidence-based guidelines concerning nutritional intervention in the setting of radiation treatment for head and neck squamous cell carcinoma (HNSCC) were included. Trials employing definitive radiation, radiotherapy in combination with chemotherapy or radiotherapy as an adjunct to surgery were reviewed. Sources were evaluated by the author for relevance to the objective of this narrative review.

Studies exclusively concerned with outcomes of surgical management of HNSCC were excluded.

Results and Discussion

In total, 106 articles were identified with 30 excluded by preliminary screening of titles and abstracts. A total of 76 articles were examined in detail with 59 being included in the final review.

Enteral feeding

Enteral feeding refers to delivery of nutrition to the stomach or small intestine (post-pyloric) via flexible tubing passed either through the nasal aperture and into the stomach (NG) or percutaneously through the anterior abdominal wall directly into the stomach (gastrostomy). These may be placed prophylactically in anticipation of patient needs prior to treatment, or reactively during treatment at a time when the patient is no longer able to meet their nutritional requirements. Evidence-based practice guidelines endorsed by the Dieticians Association of Australia dictate that the goals of nutritional intervention in HNC patients undergoing CRT should be to 'minimise a decline in nutritional status/weight and to maintain QOL and symptom management'.[13]

A study of 533 HNC patients undergoing RT by Langius et al.[11] found that individuals who lose 10% of their baseline weight during treatment had lower global QOL scores with negative impact on functioning, social eating and social contact ($P < 0.001$). Improved QOL scores have been reported in patients who have undergone nutritional counselling, which leads to less weight loss.[10,14,15] Regular contact with a dietician or other health professional providing individualised support during treatment improves outcomes and limits weight loss.[14,16,17] Interventions such as nurse-led outpatient clinics designed to educate patients and their families about EN have been trialled with promising results.[18,19]

RTOG 90-03 was a randomised prospective study conducted to compare the efficacy of four radiotherapy fractionation schedules employed in the definitive treatment of head and neck SCC.[20] A secondary analysis of the RTOG 90-03 data was published in 2006,[21] which examined the influence of NS and timing of its initiation on treatment-related toxicity and disease outcomes. Patients were divided into three groups for analysis – NS commenced before treatment, during treatment and no NS. Those patients receiving NS before treatment experienced less weight loss and a lower incidence of severe mucositis, or improved 'host' outcomes compared with the remaining cohort. Tumour outcomes, however, were significantly worse in those patients receiving NS at baseline. Five-year overall survival in the pre-treatment support group was 16%, compared with 36% in the during-treatment group and 49% in the no NS group ($P < 0.0001$). Similarly, rates of locoregional (LR) failure were greater in the pre-treatment NS group. Patient characteristics between the NS groups were unbalanced, with more advanced disease, poorer performance status and greater pre-treatment weight loss associated with early intervention. Despite these negative prognostic indicators, the results remained significant on multivariate analysis.

Re-feeding syndrome (RFS) is a metabolic complication of rapid restitution of nutritional intake first described in severely de-conditioned prisoners at the conclusion of the Second World War.[22] It is characterised

by marked electrolyte, fluid and glycaemic derangement in the context of re-feeding following a period of starvation. Patients at high risk of RFS include those with limited intake for as little as 5–10 days, oncology patients, chronic alcohol users, significant (>10%) unintentional weight loss within the preceding 3–6 months.[22,23] Head and neck cancer patients may possess one or more of these risk factors. Enteral feeding regimens must therefore be prescribed by a qualified dietician, with appropriate monitoring of fluid-balance, cardiac function and electrolytes.

Nasogastric tubes

Insertion of nasogastric tubes (NGTs) may be performed blind or under endoscopic visualisation. Once inserted, the position of the NGT should be confirmed radiologically.[9] Incorrect placement within the trachea, lungs or pleura has been reported in up to 15% of cases[23] and may cause perforation, pneumothorax or abscess if feeds or medications are introduced into the malpositioned tube. Epistaxis as a consequence of mucosal trauma during NGT insertion is another well-documented complication. Nasal alar necrosis has been reported.[24]

An NGT may cause increased upper aerodigestive tract irritation in patients already experiencing significant discomfort from treatment-induced mucositis. In addition to this foreign-body response,[23] NGTs are known to cause gastro-oesophageal sphincter dysfunction and gastric reflux. This may be significant enough to cause reflux oesophagitis or, in severe cases, aspiration pneumonia.[25] Psychological distress owing to the visibility of NGTs should not be underestimated, with NGTs serving as a tangible reminder of illness.[19,26]

Guidelines suggest that NGTs are suitable for patients anticipated to require EN for short periods of 4–6 weeks.[27,28] Dislodgement requiring reinsertion is common. NGTs should be changed after a maximum of 10 weeks. Patients may require conversion from NGT to gastrostomy feeding.[29]

Percutaneous endoscopic gastrostomy tubes

PEG tubes are passed between the stomach and external abdominal wall.[29] Gastrostomy tubes may be inserted surgically, radiologically or, most commonly, endoscopically. PEG tubes are usually inserted under conscious sedation, thus avoiding general anaesthesia and its complications. The three most common methods of endoscopic insertion are the per oral 'pull' technique, the per oral 'push' technique and the introducer technique, details of which are outlined in Table 1.

Table 1. Percutaneous endoscopic gastrostomy tube insertion techniques.

Technique	Procedure
Pull	Abdominal wall pierced with needle with attached string, string extracted via mouth, gastrostomy tube (GT) fixed to string and guided back through oesophagus, into stomach and through initial abdominal wall puncture site
Push	Similar to pull technique, however, a guidewire is utilised in place of string, with the feeding tube (FT) pushed over the wire and along wire tract
Introducer	Relies on Seldinger technique (commonly employed in angiography and central line insertion), thus eliminating need for dangerous trocar use. A guidewire is introduced into the stomach under endoscopic visualisation and a series of dilating catheters are used to increase the size of the tract before the feeding tube is inserted

Severe coagulopathy, peritonitis or pharyngo-oesophageal obstructions are absolute contraindications to PEG insertion. Relative contraindications such as pregnancy may be circumvented with careful planning. Safe insertion of PEG tubes in patients up to 29 weeks of gestation has been reported.[29] In the setting of HNC, patients with alcohol-related liver disease, portal hypertension, oesophageal varices and ascites may be encountered.

Major complications associated with PEG insertion include bowel perforation, injury to liver or spleen, bleeding, buried bumper syndrome, fistula formation, tumour seeding of the stoma site and aspiration pneumonia.[30] Major complication rates of 3–8.4% have been reported.[25,31] Injury to bowel and other abdominal organs is more likely in patients with a history of prior abdominal surgery. Buried bumper syndrome is generally considered a late complication of PEG tube insertion, however has been reported as early as 3 weeks post-procedure.[32] Sequelae include bleeding, local infection, sepsis and death. Once diagnosed, the tube must be removed, usually under endoscopic guidance.

A rare (<1%) but important complication relating to PEG insertion is that of stomal seeding which may result in abdominal wall metastases. Risk factors particularly relevant to HNC include size and location of primary tumour (especially oropharyngeal), use of the 'pull' technique, advanced stage of disease and squamous cell histology.[23]

Minor complications such as tube obstruction, dysfunction and dislodgement, peristomal leakage, superficial wound infection and pneumoperitoneum are not uncommon, with studies reporting a range of incidence rates (6–40%).[25,31,33] Administration of

prophylactic antibiotics at the time of insertion has been proven to decrease the incidence of local infection, with guidelines recommending a single dose of cephazolin be administered intravenously 30 min prior to the procedure.[34,35]

NGT versus PEG

Randomised evidence directly comparing NGT to PEG in HNC patients is scarce, which some authors attribute to patient reluctance to undergo randomisation between feeding tubes (FTs). A Cochrane Collaboration review updated in 2013 identified a single randomised control trial comparing NGT and PEG feeding in the setting of CRT for locoregionally advanced HNC.[36] This study by Corry et al.[37] saw 33 patients randomised to NGT or PEG feeding – 18 to NGT and 15 to PEG. Tubes were inserted once intake declined below 50% of calculated caloric requirement or >5 kg of weight loss from baseline. Cost of insertion of a NGT was reported as $50 AUD compared with $626 AUD for PEG tube placement. This differential reflects the need for endoscopic insertion of PEG tubes, whereas most NGTs are placed by nursing staff.

The findings of key studies comparing outcomes in patients with NGT and PEG tube feeding during treatment of HNC are summarised in Table 2.

With poor accrual for the randomised study detailed in Table 2, Corry elected to continue their study as a prospective non-randomised series from 2003. The results of their analysis of this larger cohort were subsequently published in *Head and Neck* in 2009.[42] Interestingly, after the FT options were explained to prospective participants, the majority elected to have a NGT inserted (73 vs. 32 patients). Again, PEG feeding was associated with modest weight gain at 6 weeks post-treatment (0.8 kg compared with 3.7 kg loss with NGT feeding; $P < 0.001$). Duration of tube dependence was longer in the PEG group, with patients requiring EN for a median of 146 days (range 55–617). This is in contrast to a median of 57 days (range 5–396) in the NGT cohort.

Neuromuscular fibrosis is a recognised late effect of radiotherapy and may contribute to the development pharyngo-oesophageal strictures and chronic dysphagia in HNC patients.[43–45] Swallowing is a highly co-ordinated and sophisticated mechanism[46] and despite combined CRT being advantageous in terms of organ preservation, this does not necessarily equate to preservation of function.[12] The limited studies directly comparing EN methods in HNC patients undergoing CRT have generally failed to follow patients beyond 6 months. There is evidence to suggest that patients may still develop complications many years following treatment.[5,12,44] In addition to this, the manner in which dysphagia is assessed appears inconsistent, with patient weight and FT dependence often serving as a surrogate in place of a formal swallowing assessment with a qualified speech pathologist. Evidence from Wang et al.[47] suggests that there is a lower incidence of dysphagia associated with NGT feeding ($P = 0.0005$). These findings are supported by the results of a retrospective analysis by Oozeer et al.[48] examining patient-reported swallowing outcomes more than 24 months post-CRT for HNC. Using the MD Anderson Dysphagia Inventory as a measure of day-to-day swallowing function, patients who received NGT feeding during treatment consistently scored higher across all domains ($P < 0.001$).

Muscle atrophy associated with disuse has been implicated in the aetiology of dysphagia. It follows that with decreased duration of tube dependence with NGT feeding, patients return to oral intake faster, decreasing the period of disuse. That being said, 14–18% of patients are reported to be silently aspirating[46] at the time of diagnosis which suggests a significant component of tumour-related causation.[12] Speech pathologist intervention during treatment is likely to involve prescription of swallowing exercises aimed to limit the impact of EN and maintain function.

A brief summary of the advantages and disadvantages of PEG and NGT is outlined in Table 3.

Timing of PEG insertion

In HNC patients undergoing definitive CRT there are two approaches to PEG feeding – first to insert the tubes prior to treatment in anticipation of inadequate intake or second to insert a tube when patients are no longer able to meet their nutritional requirements. Each of these methods is associated with unique advantages and disadvantages, during treatment and beyond.

Prophylactic PEG insertion minimises weight loss, limits hospitalisations relating to malnutrition and dehydration[49] and necessitates fewer interruptions to treatment.[41,50] Timely completion of treatment in SCC confers benefit in terms of tumour control probability.[51] While prophylactic placement suggests that tubes are inserted before treatment and in the absence of swallowing problems, as reported previously, many HNC patients have significant dysphagia at baseline. This is rarely accounted for in literature.

Criticisms of a prophylactic approach to PEG insertion include that a proportion of tubes go unused and are therefore unnecessary. As outlined, insertion is not without risk. A study by Madhoun[52] examining rates of prophylactic PEG utilisation demonstrated that 47% of patients treated with CRT never used their PEG or used it for less than 2 weeks. In contrast, Silander et al.[53]

Table 2. Summary of studies comparing outcomes in patients undergoing head and neck cancer treatment – nasogastric versus percutaneous.

Study	Year	Patient number	Study design	Measures	Findings
Corry et al.[37]	2008	33, PEG *n* = 15, NGT *n* = 18	Randomised trial to compare PEG and NGT in terms of nutritional outcomes, complications, patient satisfaction and cost	Baseline weight, weight loss, upper arm circumference and triceps skin fold thickness at time of tube insertion and 6 weeks post completion of treatment, duration of feeding tube use, dysphagia, quality of life (QOL) assessment	Six weeks post treatment no difference between NGT and PEG groups in terms of absolute weight or upper arm circumference, median weight loss 3 kg NGT versus 1.25 kg PEG ($P = 0.001$), NGT lower triceps skin fold thickness 9.5 versus 13.5 mm PEG ($P = 0.03$) suggesting loss of fat rather than muscle in NGT group; nil significant difference in weight loss at 6 months post insertion 2.1 kg NGT versus 0.9 kg PEG ($P = 0.43$); duration of tube feeding significantly longer in PEG group 139 days compared with 66 days NGT ($P = 0.0006$), nil significant difference in grade 3 dysphagia at 6 months; patient satisfaction with PEG greater than NGT in terms of convenience ($P = 0.03$), body image ($P = 0.05$), but nil difference in overall QOL ($P = 0.89$)
Sadasivan et al.[38]	2012	100, PEG *n* = 50, NGT *n* = 50	Prospective, randomised control study to compare the efficacy of PEG and NGT administration of EN in HNC patients undergoing curative treatment	Nutritional assessment including haemoglobin, weight, albumin, mid-arm circumference at baseline and 6 weeks post insertion; complication rates (infection and tube dislodgement); patient satisfaction at 6 weeks post-insertion of tube	Lower mean weight in PEG group 56.5 kg versus NGT 61 kg ($P < 0.01$); PEG group fared better in all nutritional parameters except serum albumin at 6 week ($P < 0.001$ all values); tube dislodgement 36% NGT and 0% PEG ($P < 0.001$), local site infection 64% NGT and 4% PEG ($P < 0.001$); modified QOL assessment at 6 weeks post tube insertion PEG showed statistically significant advantage in all aspects ($P < 0.01$ all variables)
Mekhail et al.[39]	2001	158, PEG *n* = 62, NGT *n* = 29	Retrospective review examining patterns of feeding tube use, incidence of mucositis and dysphagia, duration of tube dependence and need for pharyngo-oesophageal dilatation between patients with PEG versus NGT during treatment of head and neck cancer with radiotherapy +/ chemotherapy	Degree of mucositis and dysphagia at baseline, 1, 3, 6 and 12 months after start of treatment; need for pharyngo-oesophageal dilation; duration of tube use	Significant dysphagia more persistent among PEG versus NGT at 3 months (59% vs. 30%, $P = 0.015$), 6 months (30% vs. 8%, $P = 0.029$), but difference resolved by 12 months; median feeding tube duration 28 weeks PEG versus 8 weeks NGT $P < 0.001$; pharyngo-oesophageal dilation required in 23% PEG patients versus 4% NGT ($P = 0.022$), 20% patients treated with chemoradiotherapy versus 0% patients treated with radiotherapy alone ($P = 0.05$)
Chang et al.[40]	2009	71, PEG *n* = 7, control *n* = 64	Retrospective review examining outcomes in patients undergoing radical radiotherapy for head and neck cancer with prophylactic PEG versus those managed reactively	Absolute weight loss; percentage weight loss; admission for nutrition related factors; treatment interruption	Mean weight loss PEG 1.6 kg, control 4.4 kg ($P = 0.10$); mean percentage weight loss PEG 4.0%, control 7.1% ($P = 0.069$; linear regression adjusting for risk factors $P = 0.016$);

(*Continued*)

Table 2. Continued.

Study	Year	Patient number	Study design	Measures	Findings
					odds ratio admission for nutritional reasons for PEG versus control 0.43 (P = 0.33); 14% PEG versus 16% control required treatment interruption; 44% control group required NGT placement during treatment
Assenat et al.[41]	2011	139, PEG n = 61, control n = 78	Retrospective review to compare nutritional status and treatment interruption because of acute toxicity in patients with advanced head and neck tumours treated with combined chemoradiotherapy with or without prophylactic PEG tube	Weight loss and Nutritional Risk Index at beginning and end of treatment, interruption of treatment for toxicity and duration of interruption	Poorer nutritional status in PEG group at baseline (P < 0.0001); poorer nutritional status in control group post-treatment with median weight loss 5 kg versus 1 kg PEG (P < 0.001); 57% control group required parenteral nutrition via central venous catheter with 7/45 patients developing CVC infection; incidence of treatment interruption, duration of interruption significantly lower in PEG group (P = 0.01 and P = 0.003, respectively)
Clavel et al.[28]	2011	253, NGT n = 126, control n = 127	Retrospective review of safety and efficacy of reactive use of NGT feeding only when required in patients undergoing combined chemoradiotherapy	Weight loss, hospitalisations, complications, duration of tube use, disease-free survival and overall survival at 3 years	Median duration of NGT feeding 40 days; nil serious complications reported; nil significant difference in DFS or OS between NGT and control (83.7% vs. 82.0%, P = 0.948); median 33 month follow-up with 3.6% patients requiring gastrostomy and 0.8% requiring pharyngo-oesophageal dilatation

PEG, percutaneous endoscopic gastrostomy; NGT, nasogastric tube; CVC, central venous catheter; DFS, disease-free survival; OS, overall survival.

Table 3. Summary of NGT and PEG tube advantages and disadvantages.

Variable	PEG	NGT
Insertion	Requires sedation, theatre time or endoscopy suite	Outpatient procedure
Cost (AUD)	$626	$50
Duration	Indefinite, tube replaced annually as outpatient	<4 weeks, max. 10 weeks
Complications – acute	Less common	Dislodgement common, pain in setting of mucositis
Complications – late	Longer term tube dependence, dysphagia, increased risk of pharyngo-oesophageal strictures	Less common, shorter tube dependence
QOL	Patient satisfaction generally high	Generally considered less convenient, negative impact on social functioning and body image

PEG, percutaneous endoscopic gastrostomy; NGT, nasogastric tube; AUD, Australian Dollars.

reported that only one of 69 prophylactic tubes was not required.

A historical cohort study by Kramer et al.[49] compared outcomes in patients treated with definitive CRT or adjuvant CRT according to the timing of PEG insertion. Fifty-six patients underwent insertion of prophylactic PEG versus 30 patients who were managed expectantly. The groups were comparable across all variables except for a higher incidence of human papilloma virus (HPV) positivity in the prophylactic PEG group ($P = 0.10$). Their results demonstrate that patients treated reactively had a shorter duration of tube dependence (mean 139 vs. 227 days; $P < 0.01$). These figures correlate with the findings of a randomised trial by Salas et al.,[54] who also demonstrated an improvement in QOL measures at 6 months post-treatment in patients with prophylactic PEG ($P = 0.001$). It is important to recognise that many of these randomised studies, such as the one by Salas et al., see patients separated into intervention (prophylactic PEG) and no intervention (no placement of prophylactic PEG). As such, the comparison is not being performed directly between outcomes associated with prophylactic and reactive PEGs because a proportion of the control group will not require PEG insertion.

Analysis of the financial impact of prophylactic and reactive PEG insertion suggests significantly higher costs and longer hospitalisations associated with a reactive approach ($6233 AUD vs. $14,461 AUD).[55] This retrospective review by Baschnagel also reported higher incidence of treatment interruption (23% vs. 1%; $P < 0.01$) and long-term toxicities such as stricture and aspiration at 1 and 2 years in the reactive PEG cohort.

Implications for practice

The factors contributing to an individual's NS requirements are complex and varied. In keeping with findings from the 2013 Cochrane review[36] and the 2014 Canadian Agency for Drugs and Technologies in Health report,[56] this narrative examination of the literature has failed to demonstrate the superiority of one enteral feeding method over another.

Patients with locoregionally advanced HNC are at increased risk of malnutrition at presentation,[57,58] a circumstance compounded by the toxicities associated with definitive treatment. In clinical practice, patients frequently require NS during treatment. Obstructing tumours and severe mucositis causing odynophagia and dehydration limit the role for oral supplementation in isolation and necessitate the delivery of feeds via tube.

The timing of FT insertion is another source of controversy, with various models proposed to identify high-risk patients who are most likely to benefit from early and aggressive intervention and placement of prophylactic tubes,[27,41] Conversely it may be possible to distinguish a low-risk cohort of patients who are able to avoid the complications associated with EN without compromising outcome and optimising QOL.[57]

In the absence of randomised prospective data it seems unlikely that a consensus will be reached in the form of evidence-based guidelines to guide this aspect of care. In lieu of such guidelines, an individualised approach, encompassing patient, tumour and treatment factors, as well as the availability of specialised clinical support, must be employed. Functional outcomes QOL should be considered in tandem with oncologic outcome.[46] Strategies to reduce long-term treatment-related toxicities need to be explored, including investigation of de-escalation of treatment in the setting of HPV-related HNC and preferential sparing of vital structures such as the pharyngeal constrictor muscles using intensity modulated radiation therapy.[59]

Limitations

This overview of the literature is not a systematic review of evidence. It includes data and outcomes detailed in studies in patients who have had radiotherapy in both

definite and adjuvant settings, with and without chemotherapy.

Conclusion

The arguments for EN during combined modality treatment for HNC are certainly compelling. The best method of delivery remains unclear with unique challenges associated with both NGT and PEG feeding. The evidence in favour of a reactive approach to PEG feeding appears less conclusive and the reports of increased late toxicity are certainly of concern. The difficulties associated with recruitment for a randomised trial in a setting where patients do not recognise the need for intervention at all or express a strong preference for a particular intervention are certainly acknowledged. A multidisciplinary approach to management, particularly with support from dieticians and speech pathologists, is perhaps the most important means of maintaining function and maximising QOL.

Conflict of Interest

The authors declare no conflict of interest.

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