Supportive Care in Cancer (2019) 27:573–581
https://doi.org/10.1007/s00520-018-4352-5

ORIGINAL ARTICLE

Radiotherapy for cutaneous head and neck cancer and parotid tumours: a prospective investigation of treatment-related acute swallowing and toxicity patterns

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Received: 5 December 2017 / Accepted: 11 July 2018 / Published online: 17 July 2018

Abstract

Purpose Reports of acute treatment-related dysphagia and toxicities for patients with parotid tumours or cutaneous head and neck cancer (HNC) are limited. This study aimed to describe the severity and timing of dysphagia and related toxicities experienced during radiotherapy for cutaneous HNC and parotid tumours, to inform the nature of future speech pathology (SP) service models required during treatment.

Methods Prospective study of 32 patients with parotid tumours and 36 with cutaneous HNC undergoing curative non-surgical management. Dysphagia and acute toxicity data was collected weekly during treatment and at 2, 4 and 12 weeks post-treatment using the Functional Oral Intake Scale, diet descriptors and CTCAE v4.0.

Results In both groups, minimal treatment toxicities (grades 0–1) were observed. Xerostomia and dysgeusia were the most frequently reported grade 2 toxicities. Only 3% of parotid patients and 6% with cutaneous HNC experienced grade 3 dysphagia. Full or soft texture diets were maintained by > 70% of patients in both groups. Symptoms peaked in the final week of treatment and rapidly improved thereafter. Apart from xerostomia < 10% of patients had any grade 2 toxicity at 12 weeks post-treatment.

Conclusion Patients in these subgroups of HNC experienced minimal treatment-related toxicity during radiotherapy. As such, the need for supportive symptom management by SP is low. Models that involve interdisciplinary surveillance of symptoms with referral to SP only when required may be best suited for these individuals to ensure issues are identified whilst minimising patient burden created by unnecessary routine SP appointments.

Keywords Dysphagia · Toxicities · Radiotherapy · Parotid gland cancer · Cutaneous head and neck cancer

Introduction

Skin (cutaneous) cancer, including squamous cell carcinoma (SCC), basal cell carcinoma (BCC) and melanoma accounts for the largest number of cancers diagnosed in Australia each year [1] and is frequently located in the head and neck region due to sun exposure [2, 3]. Cutaneous SCC metastasising to the parotid lymph nodes in particular is more common in Australia compared to the northern hemisphere [4], whilst primary parotid gland carcinoma is a relatively rare disease, accounting for less than 1% of all cancers [5, 6] and 3% of head and neck cancer (HNC) [7, 8]. For both cutaneous HNC and parotid cancers (primary and metastatic), radiotherapy treatment (RT) is offered as either a single treatment modality or in combination with surgery, to help reduce the risk of recurrence and the presence of metastases [6, 7, 9–11]. The addition of radiotherapy into the management of any HNC has

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s00520-018-4352-5) contains supplementary material, which is available to authorized users.

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potential treatment impacts that may require supportive care. Non-surgical treatment-related toxicities have been most extensively studied in cohorts of patients presenting with oral, oropharyngeal, hypopharyngeal and laryngeal cancers [12–16]. However, unlike other subgroups of HNC, the nature and extent of toxicities experienced by patients with cutaneous HNC and parotid cancer are currently less well defined. Comprehensive understanding of treatment impacts for all HNC subgroups is necessary to help inform appropriate supportive care models.

Xerostomia is a recognised consequence of RT for parotid tumours, due to the sensitivity of the parotid gland to radiation and is the most commonly reported toxicity from RT for this patient group [5–7, 17–19]. Furthermore, dysgeusia, dysphagia, osteoradionecrosis, trismus, sticky saliva, mucositis, dermatitis and fibrosis have also been reported following irradiation of the parotid gland and its surrounding tissues [5–7, 10, 18, 20]. Despite evidence of potential toxicities following RT of the parotid, there is a paucity of data documenting the exact nature and severity of such toxicities. Most studies have focused on the survival and recurrence rates of patients with parotid tumours post-surgery and/or RT [5, 10, 21, 22]. Of the studies reporting treatment-related toxicities, the majority have discussed only the late toxicities with no report of the acute toxicities experienced by patients during and immediately after RT [6, 7, 9, 21]. Three known studies have explored the incidence of acute toxicities occurring within 3 months of RT [6, 18, 20]; however, reports are largely limited to mucositis with incidence rates ranging widely (e.g. 3–39% incidence of ≥ grade 2 mucositis at 3 months post-treatment) [6, 18, 20].

In the case of RT for cutaneous HNC, there are negligible reports in the literature of treatment-related toxicities including dysphagia. The most comprehensive report of RT-related toxicity for patients with cutaneous SCC was by Nottage and colleagues [23], which reported 81% of patients experienced some degree of mucositis and 19% grades 3–4 mucositis, whilst 66.7% of patients experienced some degree of dysphagia, xerostomia, and salivary gland dysfunction and 4.7% grade 3 dysphagia and xerostomia. However, that study involved a cohort of patients with cutaneous SCC receiving definitive chemoradiation limiting comparison with cohorts receiving RT alone.

Due to limited evidence regarding the nature and severity of toxicities experienced by patients with parotid and cutaneous HNC, there is minimal information on which to base the development of optimal supportive care service models for these subgroups of patients during and acutely post RT. International HNC guidelines have highlighted the importance of speech pathology (SP) in the management of swallowing, trismus and voice changes related to radiation treatment [24, 25]. However, to date, there is a lack of consensus regarding the nature of, timing and ideal patient groups to receive this support [24–26]. This has led to wide variation in the intensity and timing of SP care provided to HNC patients internationally. In the USA, a survey of usual practice found only 18.3% of respondents intervene proactively with HNC patients [26], whilst in the UK, a web-based survey found 69% were actively involved with patients during treatment [27]. Of those, 26% saw patients weekly, 3% fortnightly and 46% on request. In contrast, 57% of Australian cancer care centres reported seeing patients, often in conjunction with a dietitian, weekly during treatment as well as providing post-treatment management [28–31]. These services are generally provided as a 'one-size-fits-all' service delivery model and do not account for the specific needs of subgroups of HNC patients. A recent evaluation of this type of weekly service delivery model [29] found 24% of appointments were judged unnecessary by both patient and clinician, with a further 18% proactively cancelled by clinicians, indicating there may be patients within the broader group of HNC that are less likely to develop treatment-related side effects requiring SP support. Hence, the aim of this study was to describe the nature, severity and pattern of treatment-related toxicities, including dysphagia in patients with parotid gland cancer and cutaneous HNC during and in the acute stage post RT. It was hypothesised that these subgroups of HNC patients would experience low levels of treatment-related toxicity and dysphagia, presenting the potential for alternative SP service delivery models to be developed for these low risk groups, compared to those at high risk of treatment-related impacts.

Methods

Participants

Patients were prospectively recruited over 15 months between September 2013 and November 2014 from the combined head and neck clinic of a tertiary referral hospital which sees approximately 600 new cases of HNC annually. Patients were suitable for inclusion if they had at least one parotid gland affected by either primary, metastatic or recurrent disease; or had a cutaneous HNC; and were planned to receive either definitive RT or surgery with postoperative radiation therapy (PORT) to a prescription dose of ≥ 60 Gy with or without concurrent chemotherapy. Patients were excluded if they had a tumour site other than the parotid or a cutaneous HNC; were managed by surgery alone or were planned for less than 60 Gy. Ethical clearance was provided by the local Human Research Ethics Committee (approval number: HREC/13/QRBW/444).

Treatment planning

All patients were immobilised with custom thermoplastic shell and head and neck rest whilst the non-contrast computed

tomography (CT) simulation was performed with 2-mm slice thickness. If prescribed, custom skin bolus of appropriate thickness was outlined by the radiation oncologist. Dose constraints guidelines for the following organs at risk (OARs) were routinely defined where possible: median dose for (1) contralateral parotid mean < 26 Gy, (2) constrictors < 50 Gy mean, (3) oral cavity, larynx, oesophagus, trachea mean < 25 Gy and (4) spinal cord maximum point dose 45 Gy.

Treatment delivery

All patients underwent either 3 dimensional conformal radiation therapy (3DCRT) or helical intensity-modulated radiation therapy (H-IMRT). Consensus decision regarding which patients undergo H-IMRT as opposed to 3DCRT was made at the institutional triage meeting. 3DCRT treatments were planned in Oncentra Masterplan (Elekta, Stockholm, Sweden) using either 6–9 MeV electrons alone at a set angle, 6–10 MV photons or a combination of photon treatment with an electron boost, and delivered on a Varian Clinac iX linear accelerator (Varian Medical Systems, Palo Alto, CA, USA). H-IMRT was planned using a 6MV photon simultaneous integrated boost technique in the Hi-Art Planning Station (TomoTherapy Inc) and delivered on TomoTherapy (TomoTherapy Inc., Madison, WI, USA).

Patients receiving definitive RT received a total dose of 70 Gy over 7 weeks to gross disease with a lower elective dose to ipsilateral neck, whilst patients receiving adjuvant PORT received 60–66 Gy over 6 to 6 ½ weeks to the parotid bed with a lower elective dose to ipsilateral neck. Elective doses were a minimum of 50 Gy equivalent dose in 2 Gy fractions (assuming α/β ratio of 2). All high dose volumes were administered in 2 Gy per fraction, 5 fractions per week.

In the 5 cases included in the cohort where additional chemotherapy was provided, the concurrent chemotherapy regime, comprised of either high-dose cisplatin 100 mg/m^2 intravenous (IV) q3weekly (weeks 1, 4 ± 7), weekly cisplatin 40 mg/m^2 IV or carboplatin AUC 2 mg/ml (area under the curve, using the Calvert formula) for the duration of radiotherapy.

Procedure

Data was collected prospectively by the treating speech pathologist during routine joint speech pathology and dietetic clinics at the following time points: (1) baseline assessment (week 1 of treatment or, if unavailable, at pre-treatment combined head and neck clinic); (2) weekly over weeks 2 to 6/7 during treatment and (3) at 2, 4 and 12 weeks post-treatment. All HNC patients routinely attended an allied health education lecture in week 1 of treatment. At each time point, the presence of dysphagia and associated acute treatment-related toxicities (dysphagia, dysgeusia, xerostomia, oral mucositis, pharyngeal mucositis, salivary duct inflammation (thick saliva) and nausea) were rated using the National Cancer Institute Common Toxicity Criteria for Adverse Events Version 4.0 (CTCAE v4.0) [32]. The CTCAE was developed with international collaboration and consensus of the oncology research community [33]; it is the standard approach to adverse event reporting in cancer trials and is a widely used outcome measure in HNC. Version 3 has been validated in the HNC population [34, 35]. The current version (v4.0) harmonised its terminology with the Medical Dictionary for Medical Affairs and has been reported to have some advantages over version 3 with regard to delegating quality of life [36]. Version 4 was chosen for this study as it is the current version and the descriptors use a functional basis making it more amenable to speech pathologist rating. The texture of oral intake tolerated by patients was recorded using the National Dysphagia Diet descriptors [37] for foods (unmodified/regular, soft, minced and moist, puree) with the addition of two diet categories, liquids only and nil by mouth (NBM) and fluid consistency (unmodified/regular, mildly thick, moderately thick, extremely thick) as this is the national standard for documenting oral intake in the study country. In addition, patients' overall functional diet was coded using the Functional Oral Intake Scale (FOIS) [38]. The FOIS is a 7-level scale where 1 represents complete enteral nutrition, 2 and 3 represent some dependence on enteral nutrition with varied levels of oral intake, 4, 5 and 6 indicate modified oral intake and level 7 represents a normal diet and fluids. Though initially validated in the stroke population, the FOIS is increasingly used in HNC studies investigating dysphagia allowing for comparison across studies [39]. Baseline dysphagia was defined as a FOIS score ≤ 5 at week 1 of treatment or if unavailable, at combined head and neck clinic.

Statistical analysis

Descriptive analyses in the form of mean (standard deviation (SD)) or number (percent) were used to determine patient demographics, baseline characteristics, maximal incidence data summarised across all time points, and then at each individual time point for all outcomes monitored in the study. The temporal patterns of symptom presentation, peak and recovery, were explored by re-classifying each outcome into 'need for supportive care' or 'no need for supportive care' as per prior research [40] and analysed with descriptive statistics at each time point. 'Need for supportive care' was defined as indicating a need for SP intervention with the following criteria: CTCAE toxicity grade ≥ 2, FOIS ≤ 5 and diet/fluid descriptor other than soft or regular. All analyses were performed in IBM SPSS Statistics for Windows, version 22.0 (2013, IBM Corp., Armonk, NY., USA).

Results

Patient characteristics

A total of 32 patients with parotid disease and 36 cutaneous HNC patients met the inclusion criteria during the 15-month study period. Patients in both groups were predominantly male with a mean age of 72 years (SD 11.4) and 69.4 years (SD 13) respectively. Distributions of TNM classification and histopathology for both groups are found in Table 1. Patients in the parotid group largely presented with metastatic or recurrent disease and received adjuvant treatment with only 7 (22%) patients receiving 7 weeks of treatment (66–70 Gy). Twenty patients (63%) received 3DCRT, 12 patients (38%) received helical IMRT and 1 patient (3%) received concurrent chemotherapy. In the cutaneous HNC group, patients largely presented with T0, T1 or T3 disease and received adjuvant treatment with 12 patients (33%) receiving 7 weeks of treatment (66–70 Gy). Nine patients (25%) received 3DCRT, 24 patients (67%) received helical IMRT and 4 patients (11%) received concurrent chemotherapy. No patient in either group presented with baseline dysphagia or was recommended to receive a proactive gastrostomy as per the study institutions swallowing and nutrition risk guidelines [41].

Maximum incidence of treatment-related toxicities and dysphagia

The maximum incidence of all the CTCAE v4.0 outcomes monitored in the study for both groups can be found in Table 2. In the parotid group, the majority of patients (75–84%) experienced no (grade 0) or grade 1 oral mucositis, pharyngeal mucositis, dysphagia and nausea over the data collection period. Dysgeusia was the most frequently reported grade 2 toxicity (63%), followed by xerostomia (38%). There was minimal observed grade 3 toxicity in the cohort with only 1 patient (3%) experiencing grade 3 dysphagia. A similar pattern was found in the cutaneous HNC group with 72–97% experiencing no or grade 1 oral mucositis, pharyngeal mucositis, thick saliva, dysphagia or nausea. More cutaneous HNC patients experienced no xerostomia and dysgeusia (14 and 28% respectively) with less experiencing grade 1 xerostomia and dysgeusia (36 and 14%). Similarly, dysgeusia was the most frequently occurring grade 2 toxicity (58%), followed by xerostomia (50%), thick saliva (25%) and dysphagia (22%). There was a slightly higher incidence of grade 3 toxicity in the cutaneous HNC group with 2 patients (6%) experiencing grade 3 dysphagia, and 3% oral mucositis, pharyngeal mucositis and thick saliva.

Most severe restriction to diet (food/fluid) levels and FOIS over the acute period is represented in Table 3. Regular and soft diet was the most frequently occurring diet in both groups, with 22% of parotid and 30% of cutaneous HNC patients

Table 1 Patient demographics

Parameters	No. of patients (%)	
	Parotid ($n = 32$)	Cutaneous HNC ($n = 36$)
Mean age, year (SD)	72 (11.4)	69 (13.0)
Gender		
Female	9 (28.1)	6 (16.7)
Male	23 (71.9)	30 (83.3)
Type		
Primary	7 (21.9)	23 (63.9)
Metastatic/recurrent	25 (78.1)	13 (36.1)
T classification		
T0	21 (65.6)	13 (36.1)
T1	2 (6.3)	13 (36.1)
T2	7 (21.9)	4 (11.1)
T3	2 (6.3)	9 (25.0)
T4	0 (0)	2 (5.6)
N classification		
N0	14 (43.7)	26 (72.2)
N1	4 (12.5)	4 (11.1)
N2	13 (40.6)	6 (16.7)
N3	1 (3.1)	0 (0.0)
M classification		
M0	32 (100)	36 (100.0)
Pathology		
SCC	20 (62.5)	25 (69.4)
Adenocarcinoma	3 (9.4)	N/A
Pleomorphic adenoma	2 (6.3)	N/A
Melanoma	N/A	3 (8.3)
BCC	N/A	7 (19.4)
Other[a]	8 (25)	1 (2.9)
Radiation type		
Helical IMRT	12 (37.5)	24 (66.7)
3DCRT	20 (62.5)	9 (25)
Electrons	N/A	3 (8.3)
Treatment		
Adjuvant	25 (78.1)	31 (86.1)
Definitive	7 (21.9)	5 (13.9)
Scheduled dose		
60 Gy	20 (62.5)	19 (52.8)
63 Gy	4 (12.5)	3 (8.3)
64 Gy	1 (3.1)	2 (5.6)
66–70 Gy	7 (21.9)	12 (33.3)
Chemotherapy		
Yes	1 (3.1)	4 (11.1)
Baseline dysphagia	0 (0) $n = 31$	0 (0) $n = 28$

SCC squamous cell carcinoma

[a] Includes in the parotid group: adenoid cystic, anaplastic, hydroadenocarcinoma, merkel cell, mucoepidermoid and skin group: haemangiosarcoma

Table 2 Maximal incidence for the 7 CTCAE acute toxicities

Toxicity	Parotid ($n = 32$)				Cutaneous HNC ($n = 36$)			
	No. of patients (%)				No. of patients (%)			
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 0	Grade 1	Grade 2	Grade 3
Xerostomia	2 (6.3)	18 (56.3)	12 (37.5)	0 (0)	5 (13.9)	13 (36.1)	18 (50)	0 (0)
Dysgeusia	6 (18.8)	6 (18.8)	20 (62.5)	N/A	10 (27.8)	5 (13.9)	21 (58.3)	N/A
Oral mucositis	14 (43.8)	11 (34.4)	6 (16.7)	0 (0)	19 (52.8)	10 (27.8)	6 (16.7)	1 (2.8)
Pharyngeal mucositis	20 (62.5)	5 (15.6)	7 (21.9)	0 (0)	30 (83.3)	3 (8.3)	2 (5.6)	1 (2.8)
Thick saliva	11 (34.4)	15 (46.9)	6 (18.8)	0 (0)	14 (38.9)	12 (33.3)	9 (25)	1 (2.8)
Dysphagia	14 (43.8)	9 (28.1)	8 (25)	1 (3.1)	16 (44.4)	10 (27.8)	8 (22.2)	2 (5.6)
Nausea	20 (62.5)	7 (21.9)	5 (15.6)	0 (0)	28 (77.8)	7 (19.4)	1 (2.8)	0 (0)

CTCAE Common Toxicity Criteria for Adverse Events version 4

requiring a modified diet. Two patients in the parotid group required a liquid-only diet for short periods due to pain whilst in the cutaneous HNC group, 4 patients required a liquid-only diet due to dysgeusia affecting appetite. One patient in the cutaneous HNC group receiving concurrent high dose cisplatin required mildly thick fluids from week 4–6 of treatment but returned to thin fluids from week 7 onwards. No patient in the parotid group required modified fluids.

Patterns of treatment-related toxicities and dysphagia over time

The pattern of treatment-related toxicity and dysphagia requiring support over time is represented for each group in Fig. 1 and Fig. 2 respectively. Excluding xerostomia and dysgeusia, less than 10% of patients presented with toxicity requiring support until week 5 of treatment, where it was still 20% or less for both cohorts. Symptoms, if present, peaked in week 5 or 6 of treatment for those with parotid tumours and week 6 for those with cutaneous HNC. Post-treatment recovery was rapid with no more than 8% of patients in the parotid group and 14% of patients in the cutaneous HNC group experiencing any toxicity other than xerostomia or dysgeusia at 2 weeks post-treatment. Weekly incidence data tables can be found in supplementary materials.

Discussion

This study provides descriptive information regarding the acute toxicity and dysphagia outcomes for patients with parotid and cutaneous HNC receiving RT which can be used to

Table 3 Maximum incidence of diet, fluids and FOIS

Parameter	Categories	Parotid ($n = 32$) No. of patients (%)	Cutaneous HNC ($n = 36$) No. of patients (%)
Diet	Regular	14 (43.8)	16 (44.4)
	Soft	11 (34.4)	9 (25.0)
	Minced	3 (9.4)	4 (11.1)
	Puree	2 (6.3)	3 (8.3)
	Liquids only	2 (6.3)	4 (11.1)
	NBM	0 (0)	0 (0)
Fluids	Thin	32 (100)	35 (97.2)
	Mildly thick	0 (0)	1 (2.8)
FOIS (minimum)	Level 7	14 (43.8)	16 (44.4)
	Level 6	11 (34.4)	10 (27.8)
	Level 5	5 (15.6)	6 (16.7)
	Level 4	2 (6.3)	4 (11.1%)
	Level 3	0 (0)	0 (0)
	Level 2	0 (0)	0 (0)
	Level 1	0 (0)	0 (0)

FOIS Functional Oral Intake Scale

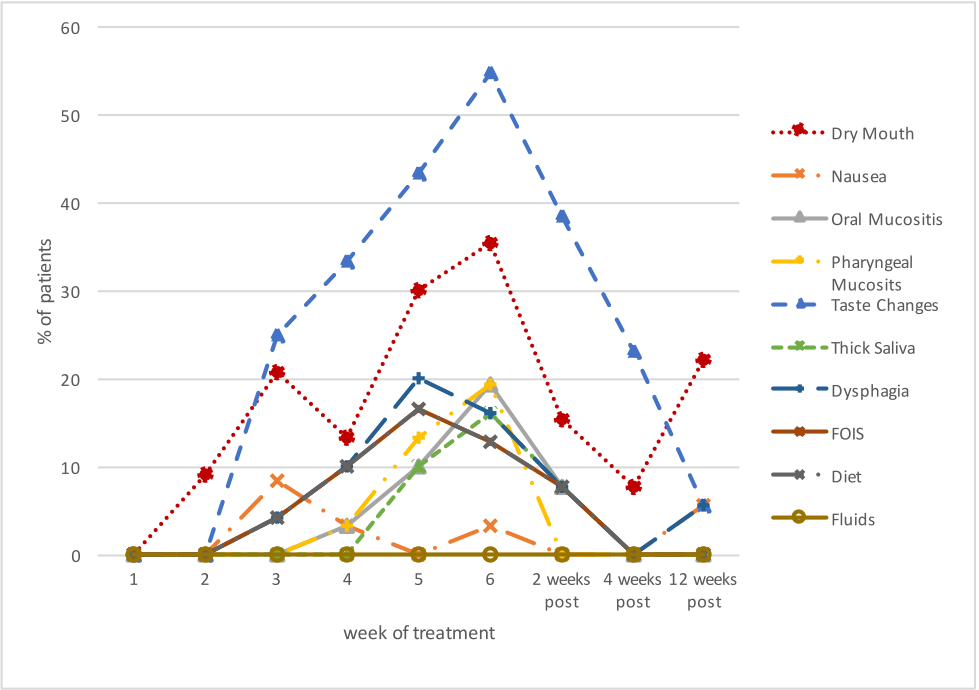

Fig. 1 Symptoms requiring support at weeks 1–6 and 2, 4, 12 post-treatment for patients with parotid tumours. *Week 7 data excluded as only 7 patients received 7 weeks of treatment

inform the design of future SP supportive care services for these patient groups. Overall, results indicate that both subgroups of patients present with low levels of treatment-related toxicity. As such, current weekly SP service delivery models being implemented for other tumour groups that experience higher levels of toxicities, such as oropharyngeal cancer, would not appear to be appropriate.

Within both the parotid and the cutaneous HNC subgroups, the most frequently occurring toxicities, with grade 2 severities, were dysgeusia and xerostomia. This result is unsurprising given the radiation treatment fields for parotid tumours and many cutaneous HNCs involve irradiation of part of the buccal mucosa, palate, lateral tongue and floor of mouth, which may affect minor salivary glands and areas of the

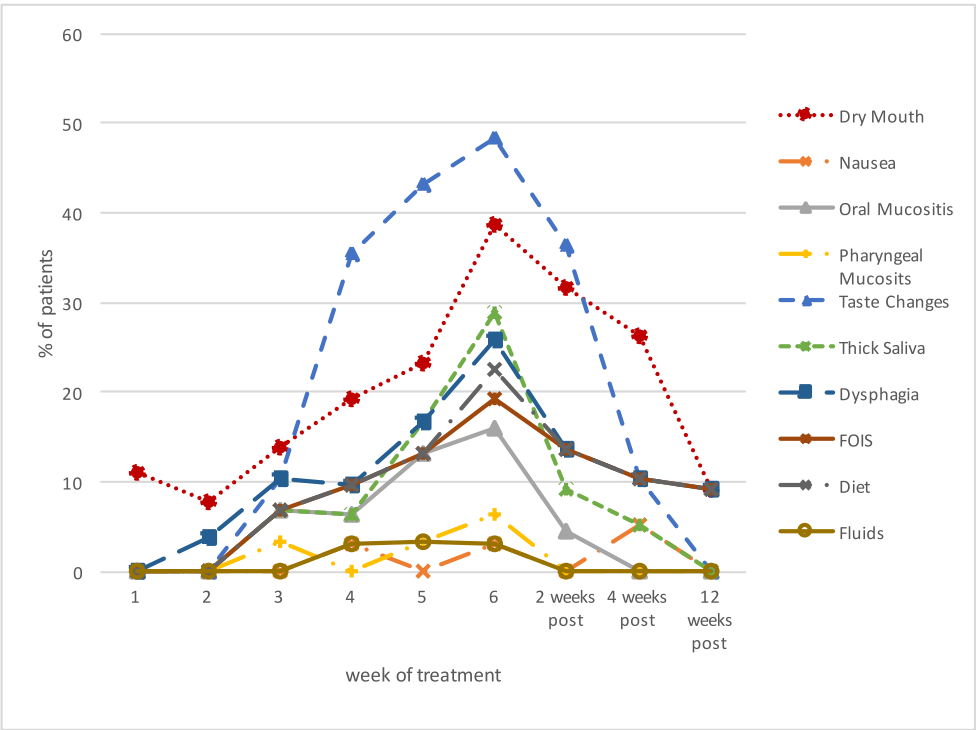

Fig. 2 Symptoms requiring support at weeks 1–6 and 2, 4, 12 post-treatment for patients with cutaneous HNC. *Week 7 data excluded as only 12 patients received 7 weeks of treatment

tongue responsible for taste production [17, 42]. Particularly for those patients within the parotid group where RT occurs following surgical removal of a major salivary gland, xerostomia is a recognised long-term quality of life issue [5].

Although both dysgeusia and xerostomia were the most frequently occurring grade 2 symptoms relative to the other parameters measured, the rates of acute toxicity of both were low in the two subgroups, consistent with the evidence reported to date. Within the parotid group, rates of grade 2 mucositis (15–23%) reported by Olivier et al. [20] and Spiro et al. [43] are comparable with the 17 and 22% for oral and pharyngeal mucositis observed in this study. Other studies have reported even lower incidence rates, reporting only 3–5% grade 2 mucositis in their cohorts of the parotid patients [6, 18]. Previously reported rates of acute xerostomia are also lower than those found in the current study, with prior studies reporting grade 2 xerostomia ranging from 5 to 22% [6, 18, 43], compared to the 38% in this cohort. Rates of reported dysphagia have had limited discussion in the parotid literature to date. Chung et al. [6] reported an incidence of grade 2 dysphagia at 3% (1 patient) which is once again lower than the 25% observed in the current cohort. Although both the prior studies and the current study suggest low rates of grade 2 toxicities, the higher incidence rates observed in the current study may simply reflect the different rating tools used (e.g. RTOG and CTCAE v 2.0), population differences and the difference between retrospective versus prospective studies. It is well accepted that there is potential for underreporting of symptoms when relying on retrospective data collection methods. The discrepancies may also reflect differences in the rater (medical officer versus speech pathologist) conducting the measures between the current and prior studies.

To the authors' knowledge, Nottage et al. [23] is the only prior study reporting acute toxicity outcomes for patients with cutaneous HNC receiving RT. Although conducted at the same institution as the current study, the entire cohort reported by Nottage et al. received definitive concurrent chemotherapy. Concurrent chemotherapy is known to influence toxicity profiles [40, 44] and increase symptoms such as mucositis, which was observed in 81% of their cohort. As only 4 patients in the current study's cutaneous HNC group received concurrent chemotherapy, there is little value in direct comparison between the two groups. However, greater incidence of grades 2 and 3 toxicity was observed in the 4 patients who received concurrent chemotherapy, indicating more significant issues can be expected in cutaneous HNC patients who receive additional systemic therapy.

Details of the pattern of acute symptom onset, peak and recovery revealed the onset of symptoms requiring SP support occurred in weeks 3–4, with a slow increase in toxicities reaching peak incidence in the final week of treatment. Notably, there was a steep increase in the incidence of dysgeusia from weeks 2–4 of treatment for the parotid group and from weeks 3–4 for the cutaneous HNC group. Toxicities rapidly improved following treatment. For the parotid group at 4 weeks post-treatment, no patients required support for nausea, oral or pharyngeal mucositis, thick saliva or dysphagia. The only persistent toxicities at 12 weeks post-treatment were grade 2 dysgeusia and dysphagia (6%) and grade 2 xerostomia (22%). Whilst rapid improvement post-treatment was also observed in the cutaneous HNC group, a higher number of patients with dysphagia required support at 4 (11%) and 12 (9%) weeks post-treatment than in the parotid group. These patterns of symptom profile are similar to that found by the current study's team in a larger cohort of mixed site HNC patients receiving helical IMRT with and without concurrent chemotherapy and a cohort of patients with oropharyngeal SCC receiving helical IMRT with concurrent chemotherapy [40, 45]. Whilst the pattern is similar, the severity and incidence of toxicities requiring SP support was far lower in the current study's groups where the impact on swallowing function was minimal and largely transient, and no patient required alternative feeding.

The low number of patients who experienced toxicities requiring support in the current data confirms these subgroups of patients represent groups who may not require routine speech pathology management in conjunction with their radiation treatment. Alternative service delivery models utilising screening or surveillance may better suit the needs of these patients to minimise unnecessary appointments for patients whilst allowing for re-allocation of services to patients at higher risk of dysphagia and related toxicities requiring support. Hence, the results of the current study fill a gap in the literature documenting the supportive needs of patients with parotid tumours and cutaneous HNC and can contribute to the evidence base required to develop more specific evidence-based guidelines for speech pathology support for HNC patients.

Whilst this is the first known prospective study reporting the incidence, severity and pattern of dysphagia as well as a range of treatment-related toxicities following RT in patients with parotid tumours and cutaneous HNC, the authors acknowledge several limitations. A larger cohort of patients would have strengthened the results, whilst the addition of a patient-reported quality of life measure and a longer data collection period post-treatment completion would have provided a more comprehensive evaluation. An instrumental swallow assessment would have provided a more objective assessment of dysphagia; however, it is not a routine practice at the study institution to conduct an instrumental swallow assessment unless clinically indicated.

Conclusion

This study confirms there is a low incidence of acute toxicities including dysphagia requiring SP intervention amongst

patients with tumours of the parotid or cutaneous HNC undergoing RT. These subgroups of HNC patients are less likely to require regular weekly SP support during treatment and could be considered for an alternative service delivery model. These results have implications for SP service delivery planning and can inform service delivery guidelines. Development and evaluation of alternative service delivery models that are better suited to identify low incidence issues is required for these subgroups of low-risk HNC patients.

Acknowledgements The authors wish to acknowledge the multidisciplinary Head and Neck team at the Royal Brisbane and Women's Hospital for their support of this project.

Funding information This work received funding from the RBWH Foundation Research Grant, 2014–2015.

Compliance with ethical standards

Ethical clearance was provided by the local Human Research Ethics Committee (approval number: HREC/13/QRBW/444).

Conflict of interest The authors declare that they have no conflict of interest.

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