Prevalence of Functional Problems After Oral Cavity Malignancy Treatment at a Tertiary Center: Utilizing PSS HN (Performance Status Scale for Head and Neck) Scale

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Abstract

Background Oral cancer is the most common type of cancer occurring in India and it is equally important to assess morbidities after treatment for optimal utilization of resources. Utilizing PSS HN we try to identify the patient population who are severely impaired and need aggressive rehabilitation.

Method and Material The PSSHN questionnaire was administered by the treating physician to 100 consecutive oral cancer patients who completed their index treatment at least 6 months prior to accrual. Functional morbidities with score ≤ 50 were considered as significant.

Results Prevalence of functional deficit of eating in public; deficit of understandability of speech and deficit of normalcy of diet were 28, 13 and 38 % respectively.

Conclusion Type of resection either segmental mandibulectomy or major glossectomy, had most significant impact on concerned functional deficits and surgeries involving these defects should be carefully planned to involve free flap reconstruction and proper postoperative rehabilitation.

Keywords Functional outcome · PSS HN (Performance Status Scale for Head and Neck) scale · Quality of life · Oral Malignancies

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Introduction

Oral cancer is the most common type of cancer occurring in India and comprises 12.6 % of all cases in men, 3.1 % in women and 6.6 % of all cases in both sexes as per GLOBOCON cancer fact sheet [1]. With the advent of better surgical techniques and intensified adjuvant treatment, survival of the disease has improved for all stages; however survivors still experience severe functional disability after treatment because of unique functions related to this anatomic region [2].

Though there is literature on quality of life (QOL); magnitude of functional deficits or morbidities faced by survivors after treatment has not been addressed adequately in the literature. In Indian scenario where oral cancer is a common health problem with reasonable survival after treatment; it becomes equally important to assess these morbidities for optimal utilization of resources. Study by Gliklich et al. [3], highlighted the importance of site specific quality of life measures and these should include

domains that reflect eating/swallowing, speech/communication, and physical appearance. Studies have demonstrated that overall QOL improved towards pretreatment baseline by 12 months on an average after curative treatment [4]. However, the head and neck cancer specific problems remain important throughout and these functional problems should remain at higher priority [5, 6].

To assess the unique domains of dysfunction experienced by head and neck cancer patient population, List et al. [7] designed and validated Performance Status Scale for Head and Neck (PSS HN). The PSS HN has been found to discriminate the levels of functioning across the broad spectrum of head and neck cancers particularly for oral cancers, and has demonstrated good reliability as well as sensitivity to differences in performance and change over time [7, 8, 9]. Apart from a single study which evaluated the PSS HN scale after concomitant chemoradiation in head and neck cancer, no work had been performed in Indian population where oral cancer predominates [10].

Dividing scores into clinically meaningful benchmarks helps in providing reference scores for appropriate interpretation by the treating physician. In an effort for everyday clinical use of quality of life (QOL) scores; Funk et al. [11] divided a 30 item Head and Neck Inventory score into clinical benchmark of high (70–100); intermediate (30–69) and low (0–30). List et al. [8] dichotomized patients into high versus low PSS HN score as >50 or ≤ 50 and considering ≤ 50 as unsatisfactory with significant morbidity. Utilizing this PSS HN, we may be able to identify the patient population who is severely impaired and needs aggressive rehabilitation. This may also serve to find the better survivors.

Aim and Objectives

The aim of this study was to assess the magnitude of functional problems in oral cavity cancer patients following the completion of index treatment. Primary outcome was the prevalence of three functional problems; as assessed by subscales of PSS HN. The secondary outcomes were to assess the effect of other variables like tumor subsite, stage at presentation and the treatment.

Methodology

One hundred consecutive oral cancer patients who completed their index treatment at least 6 months prior to accrual were part of this study. Study included stage III and IV survivors, with good performance status (ECOG 2 or better) and willing to give informed consent for participation. The PSS HN questionnaire was administered by the

treating physician at the hospital. The final score and subscale scores of PSS HN were tabulated for each patient. Score ≤ 50 was considered as unsatisfactory and morbidity as significant. After collecting data of 100 consecutive patients, we calculated the prevalence of functional problems faced by this group of patients. Demographic variables, PSS HN scale domain score, were presented as frequency (percentage) and mean, median as appropriate. Categorical variables (PSS HN scale domain) were analyzed using Chi square test or Fisher's exact test (for binary variable). P value < 0.05 was considered as statistically significant.

Results

The compliance was 100 %. Characteristics of patients participating in the study are provided in Table 1. Buccal mucosa was the commonest subsite (34 %) with hemimandibulectomy or segmental mandibulectomy accounting for majority of surgeries (49 %) (Fig. 1). All patients completed their adjuvant treatment except for one because of comorbidities. Median duration of followup was 26 months and ranges from 6 month to 10.6 years.

Significant PSS HN scores i.e. ≤ 50 for each of the three functional deficits as per frequency table are demonstrated in Fig. 2. Prevalence of the functional deficit of eating in public, deficit of understandability of speech and deficit of normalcy of diet were 28, 13 and 38 % respectively (Fig. 2). The overall magnitude of these three functional deficits was found to be 42 % and the morbidity of normalcy of diet was the most common morbidity.

All the three functional deficits with p values are tabulated in Table 2. All the three morbidities were affected significantly by subsite distribution. Oral tongue is the subsite most commonly affecting these morbidities. It was evident that lesions affecting central region i.e. tongue contribute to more morbidity compared to more lateral lesions (Table 3). We did not find any significant effect pertaining to stages III versus IV at presentation on any of the morbidity. Similarly comorbidities were not found to affect significantly any of these morbidities.

Type of surgery was found to be statistically significant for the morbidity of normalcy in diet (p value = 0.011). Surgeries involving bony resection in the form of either segmental or hemimandibulectomy contribute to majority of these morbidities. Bony resection is the limiting factor in normalcy of diet and the morbidity increase as the extent of bony resection increase i.e. segmental mandibulectomy contributes more than marginal mandibulectomy. Among central lesions, major tongue resection is the limiting factor compared to lesser extent tongue resections (Table 4). Eating in public and understandability of speech were not

Table 1 Patient's demographic profile

Patients characteristics (n = 100)	Frequency	Percent
<i>Sex</i>		
Male	87	87.0
Female	13	13.0
<i>Pathology</i>		
Squamous cell carcinoma	99	99
Adenoid cystic carcinoma	1	1
<i>Stage</i>		
III	17	17
IV	83	83
<i>Subsite</i>		
Oral tongue	24	24
Buccal mucosa and upper alveolus	34	34
Lower alveolus	27	27
FOM	4	4
RMT	10	10
Lower lip	1	1
<i>Neoadjuvant therapy</i>		
None	98	98
NACT	2	2
<i>Surgery</i>		
Tongue wide excision/ hemiglossectomy	15	15
Major/total glossectomy	9	9
Buccal mucosa and lip wide excision	6	6
Buccal mucosa marginal/ bite marginal mandibulectomy/upper alveolectomy	21	21
Buccal mucosa composite resection (hemi/segmental mandibulectomy)	49	49
<i>Reconstruction</i>		
Primary closure	24	24
Local flap/skin grafting	7	7
Pedicled flap	48	48
Free flap	21	21
<i>Adjuvant therapy</i>		
Radiation therapy	70	70
Chemoradiation	29	29
No adj therapy	1	1

found to be significantly affected by the type of surgery performed.

Type of reconstruction was a significant variable for the morbidity of normalcy of diet (p value = 0.047). Free flaps led to better functional outcome compared to pedicled flaps. Morbidity of eating in public was not significantly affected by the type of reconstruction, but free flaps showed a trend of better functional results compared to the pedicled flaps. Understandability of speech was not affected significantly by the type of reconstruction. Effect of different adjuvant treatments i.e. radiation therapy versus chemoradiation was not found to be significant for any of the morbidities.

Discussion

Quality of life measures are routinely administered in research settings, but in clinical practice they are not widely used. Potential benefits of using these tools include identifying and prioritizing the specific problems experienced by the survivors. A study by Veilkova et al. [12] found that the patients reported better compliance and quality when their physicians were sensitized to QOL parameters. Rogers et al., de Graeff et al. and Bjordal et al. concluded that there is a sudden deterioration in the quality of life immediately postoperatively which improved gradually with time, however taste, smell, swallowing, dry

Fig. 1 Subsite wise distribution

mouth remained affected even on long term [13–15]. The prevalence of these functional morbidities are not commonly addressed in community despite being significantly affecting oral cancer survivors. We restricted our study to disease free population of advanced stage oral cavity malignancy as this is the population which is treated most

aggressively, receive multimodality treatment and most affected by the morbidities.

Normalcy of diet has the highest magnitude and most of the sufferers restricted their diet to soft diet or liquid diet. Those who suffered most also tried to restrict eating in public to precise places with specified persons as they require special preparation according to their eating deficits. These are considerable problems even today and require continuous attention for improvement in the treatment. This is also supported by a study on Indian population, though in a different context, which showed that normalcy of diet is the most commonly affected deficit after chemoradiation of head and neck malignancies [10].

Subsite distribution had affected all the three morbidities significantly. Oral tongue was the subsite with most common prevalence of functional deficits in all the three morbidities. This was expected as the tongue is a central organ with functions important for eating and speaking. Zelefsky et al. [16] evaluated 35 post surgery and post radiotherapy advanced oral cavity and oropharyngeal cancer patients with the performance status scale and reported worse scores in patients with lesions in the posterior tongue than in the mobile tongue, floor of the mouth or tonsils. Normalcy of diet was also hampered by the cancer approaching lower alveolus as surgery of this part requires

Fig. 2 PSS HN functional deficits

Table 2 *P* value of variables

	Eating in public	Understandability of speech	Normalcy of diet
Subsite	0.045	0.000	0.019
Stage at presentation	0.475	0.841	0.893
Comorbidity	0.249	0.388	0.762
Type of surgery	0.366	0.53	0.011
Type of reconstruction	0.091	0.388	0.047
Type of adjuvant treatment	0.696	0.152	0.952

Table 3 Normalcy of diet (N score) subsite correlation

	Subsite							Total
	Oral tongue	Buccal mucosa	Upper alveolus	Lower alveolus	FOM	RMT	Lower lip	
N Score								
≤50								
Count	12	7	1	8	3	7	0	38
% Within N score	31.6	18.4	2.6	21.1	7.9	18.4	.0	100.0
% Within subsite	50.0	21.2	100.0	29.6	75.0	70.0	.0	38.0
% of total	12.0	7.0	1.0	8.0	3.0	7.0	.0	38.0
>50								
Count	12	26	0	19	1	3	1	62
% Within N score	19.4	41.9	.0	30.6	1.6	4.8	1.6	100.0
% Within subsite	50.0	78.8	.0	70.4	25.0	30.0	100.0	62.0
% of total	12.0	26.0	.0	19.0	1.0	3.0	1.0	62.0
Total								
Count	24	33	1	27	4	10	1	100
% Within N score	24.0	33.0	1.0	27.0	4.0	10.0	1.0	100.0
% Within subsite	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
% of total	24.0	33.0	1.0	27.0	4.0	10.0	1.0	100.0

Table 4 Normalcy of diet (N score) according to type of surgery

	Surg					Total
	1	2	3	4	5	
N score						
≤50						
Count	4	3	14	9	8	38
% Within N score	10.5	7.9	36.8	23.7	21.1	100.0
% Within surgery	26.7	50.0	28.6	42.9	88.9	38.0
% of total	4.0	3.0	14.0	9.0	8.0	38.0
>50						
Count	11	3	35	12	1	62
% Within N score	17.7	4.8	56.5	19.4	1.6	100.0
% Within surgery	73.3	50.0	71.4	57.1	11.1	62.0
% of total	11.0	3.0	35.0	12.0	1.0	62.0
Total						
Count	15	6	49	21	9	100
% Within N score	15.0	6.0	49.0	21.0	9.0	100.0
% Within surgery	100.0	100.0	100.0	100.0	100.0	100.0
% of total	15.0	6.0	49.0	21.0	9.0	100.0

1. Tongue wide excision/hemiglossectomy
2. Buccal mucosa wide excision/lip wide excision
3. Hemimandibulectomy/segmental mandibulectomy
4. Bite resection/marginal mandibulectomy/maxillectomy
5. Near total glossectomy/total glossectomy

bony resection leading to some form of dietary adjustments.

Our study population included stage III and stage IV oral cavity malignancy and here stage was not a significant

variable for any of the morbidity. This is because all patients received multimodality treatment, so long term results were not different. Campbell et al. [17] evaluated 72 head and neck cancer survivors using the questionnaires of

the University of Washington, PSS HN, the FACT-G (functional assessment of cancer therapy general) scale and the FACT-HN. They found advanced cancer stage to be related with lower scores and patients treated with RT alone had significantly better scores than those treated with multimodality treatment. It is the type of surgical treatment which had more significant effect on morbidity rather than the stage at presentation among advanced stage oral cavity malignancies. Comorbidities also did not affect morbidity prevalence significantly. Studies that have examined the impact of comorbid status on HRQOL are scarce and have yielded conflicting results. Pourel et al. and Taylor et al. found no significant association between comorbidity and QOL while Terrel et al. reported a clear effect of comorbidity in patients with two or more comorbid conditions [18–20]. This may be because as a result of improvement in medical management now-a-days, most of the surgeries are performed under controlled conditions with due peri-operative monitoring. A larger population study may show some positive correlation.

Normalcy of diet was affected significantly by the type of surgery. Segmental or hemimandibulectomy affect most adversely. Among lateral subsites, involvement of bone and extent of bony resection is the contributing factor for this morbidity. Segmental mandibulectomy result in higher morbidity compared to marginal mandibulectomy. Similarly in a study, Villaret et al. [21] showed considerable worsening of chewing domain on multivariate analysis in patients undergoing segmental mandibulectomy. Similarly major resection of the tongue increases the morbidity. Amount of residual tongue mobility is more deciding in functional outcome rather than amount of tongue resection [21]. Eating in public was not affected significantly by the type of surgery, but there was a trend towards increased morbidity with segmental mandibulectomy. There was a trend towards increased difficulty of understandability of speech with bony resection and major glossectomy. This limitation of statistically insignificant results may be because of the small study population and with a study on a larger population it may be more clarified. Postoperative speech and swallowing rehabilitation is vital in improving functional outcome and should be implemented in time [22].

Type of reconstruction also affected normalcy of diet significantly. Survivors with free flaps had better function compared to those with a pedicled flap. In the present study type of reconstruction did not seem to have significant influence on eating in public and understandability of speech. This may be because the impact of surgical parameters on the functional outcome of free flap reconstruction is complex and anatomic subsite of tumor location influences the postoperative QOL. Studies have been carried out which reported worser functional results in

patients with extensive defects reconstructed by pedicled flaps [23, 24]. Vaughan et al. reported functional improvement and better social adaptation after the introduction of free flaps and these findings have been validated by Bolzoni Villaret et al. [21, 25]. Free flap reconstruction result in better QOL with superior functional outcome and the findings are supported by our study [20]. Adjuvant treatment in the form of radiation therapy or chemo radiotherapy produced similar functional deficits without any significant difference. This may be because main toxicities of chemoradiation are acute and by 6 month difference in morbidity of radiation therapy versus chemoradiation may decrease.

This study is unique in this regard that it tried to find the magnitude of the problem which is to be improved and this study had met its goal of effectively utilizing PSS HN scale for calculating baseline prevalence of functional deficits. Small study population is the limitation of this prospective study, however if a study is done with a larger population, effect of comorbidity and type of adjuvant treatment may be more elucidated.

Conclusion

Prevalence of functional deficit of eating in public, understandability of speech and normalcy of diet were 28, 13 and 38 % respectively. Type of resection either segmental mandibulectomy or major glossectomy, had the most significant impact on concerned functional deficits, rather than subsite involved or other factors. Surgeries involving these defects should be carefully planned to involve free flap reconstruction and proper postoperative speech and swallow rehabilitation.

References

1. GLOBOCAN 2012 (IARC) Section of cancer information (2014). http://globocan.iarc.fr/Pages/fact_sheets_population.aspx
2. Morton RP, Davies ADM, Baker J, Baker GA, Stell PM (1984) Quality of life in treated head and neck cancer patients: a preliminary report. *Clin Otolaryngol* 9:181–185
3. Gliklich RE, Goldsmith TA, Funk GF (1997) Are head and neck specific quality of life measures necessary? *Head Neck* 19(6):474–480
4. Weymuller E et al (2000) Quality of life in patients with head and neck cancer. *Arch Otolaryngol Head Neck Surg* 126:329–335
5. Rogers SN, Laher S, Overend L, Lowe D (2002) Importance-rating using the University of Washington Quality of Life questionnaire in patients treated by primary surgery for oral and oropharyngeal cancer. *J Cranio-Maxillofac Surg* 30:125–132
6. Hassan SJ, Weymuller EA (1993) Assessment of quality of life in head and neck cancer patients. *Head Neck* 15:485–496
7. List MA, Ritter-Sterr C, Lansky S (1990) A performance status scale for head and neck cancer patients. *Cancer* 66:564–569

8. List MA, D'Antonio LL, Cella DF, Siston A, Mumby P, Haraf D, Vokes E (1996) The performance status scale for head and neck cancer patients and the functional assessment of cancer therapy-head and neck scale: a study of utility and validity. *Cancer* 77(11):2294–2301
9. List MA, Mumby P, Haraf D, Siston A, Mick R, MacCracken E, Vokes E (1997) Performance and quality of life outcome in patients completing concomitant chemoradiotherapy protocols for head and neck cancer. *Qual Life Res* 6(3):274–284
10. Agarwal JP, Dutta D, Palwe V et al (2010) Prospective subjective evaluation of swallowing function and dietary pattern in head and neck cancers treated with concomitant chemo-radiation. *J Cancer Res Ther* 6(1):15–21
11. Funk G (2004) Clinical significance of health status assessment measures in head and neck cancer. *Arch Otolaryngol Head Neck Surg* 130:825–829
12. Velikova G, Booth L, Smith A et al (2004) Measuring quality of life in routine oncology practice improves communication and patient well-being: a randomized controlled trial. *J Clin Oncol* 22:714–724
13. Rogers SN, Humphris G, Lowe D, Brown JS, Vaughan ED (1998) The impact of surgery for oral cancer on quality of life as measured by the medical outcomes short form 36. *Oral Oncol* 34:171–179
14. de Graeff A, de Leeuw JRJ, Ros WJG, Hordijk GJ, Blijham GH, Winnubst JAM (2000) Long-term quality of life of patients with head and neck cancer. *Laryngoscope* 110:98–106
15. Bjordal K, Ahlner-Elmqvist M, Hammerlid E, Boysen M, Evensen JF, Björklund A et al (2001) A prospective study of quality of life in head and neck cancer patients part II: longitudinal data. *Laryngoscope* 111:1440–1452
16. Zelefsky MJ, Gaynor J, Kraus D, Strong EW, Shah JP, Harrison LB (1996) Long-term subjective functional outcome of surgery plus postoperative radiotherapy for advanced stage oral cavity and oropharyngeal carcinoma. *Am J Surg* 171:258–262
17. Campbell BH, Marbella A, Layde PM (2000) Quality of life and recurrence concern in survivors of head and neck cancer. *Laryngoscope* 110:895–906
18. Pourel N, Peiffert D, Lartigau E, Desandes E, Luporsi E, Conroy T (2002) Quality of life in long-term survivors of oropharynx carcinoma. *Int J Radiat Oncol Biol Phys* 54(3):742–751
19. Taylor JC, Terrell JE, Ronis DL et al (2004) Disability in patients with head and neck cancer. *Arch Otolaryngol Head Neck Surg* 130:764–769
20. Terrell JE, Ronis DL, Fowler KE et al (2004) Clinical predictors of quality of life in patients with head and neck cancer. *Arch Otolaryngol Head Neck Surg* 130:401–408
21. Villaret Ab, Cappiello J, Piazza C, Pedruzzi B, Nicolai P (2008) Quality of life in patients treated for cancer of oral cavity requiring reconstruction: a prospective study. *Acta Otorhinolaryngol Ital* 28(3):120–125
22. Logemann JA, Pauloski BR, Rademaker AW, Colangelo LA (1997) Speech and swallowing rehabilitation for head and neck cancer patients. *Oncology* 11(15):651–659
23. Schliephake H, Ruffert K, Schneller T (1996) Prospective study of the quality of life of cancer patients after intraoral tumor surgery. *J Oral Maxillofac Surg* 54:664–669
24. Schliephake H, Schmelzeisen R, Schonweiler K, Schiller T, Henbernd C (1998) Speech, deglutition and life quality after intra-oral tumour resection: a prospective study. *Int J Maxillofac Surg* 27:99–105
25. Vaughan ED, Bainton R, Martin IC (1992) Improvements in morbidity of mouth cancer using microvascular free flap reconstructions. *J Craniomaxillofac Surg* 20:132–134