



Impact of Oral Rehabilitation on Patients with Head and Neck Cancer: Study of 100 Patients with Liverpool Oral Rehabilitation Questionnaire and the Oral Health Impact Profile

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Abstract Prosthodontic rehabilitation enables head and neck cancer patient to optimally restore function, thereby improving and enhancing the oral health related quality of life of cancer patients. The liverpool oral rehabilitation questionnaire (LORQ-v3) and oral health impact profile (OHIP) are specific tools that measure OHRQOL. Hundred patients with head and neck cancer were included in the study. Patients were asked to rate their experience of dental problems before fabrication of prosthesis and after 1 year using LORQv3 and OHIP-14. The responses were compared on Likert scale. There were extreme problems reported by head and neck cancer patients before dental rehabilitation. After 1 year of prosthetic rehabilitation, there was improvement noticed in all the domain of LORQ-v3 and OHIP-14. Complete compliance to the use of prosthetic appliances for 1 year study period was noted. For all the items of LORQ-v3 there was 10 to 38% improvement in function. OHIP-14 showed an 11 to 26% improvements in all the domains. Prosthetic rehabilitation

contributed to an improvement of patients with head and neck cancer, in view of the decreased scores on the Likert scale after prosthetic treatment. The study of hundred patients with head and neck cancer showed that the oral health-related quality of life improved after prosthodontic rehabilitation.

Keywords Head and neck cancer · Rehabilitation · Denture · Obturators · Quality of life

Introduction

Head and neck cancer patients often undergo surgery, radiotherapy and chemotherapy or a combination of these modalities as a part of their treatment. This has a severe impact on the oral cavity, affecting the basic functions, such as speech, swallowing, chewing, or salivation. As a result, physical, psychological and social well-being of these individuals is severely affected [1], thus worsening their quality of life [2–4]. After completion of treatment, a shift is seen in patient's concerns from survival towards improvement and maintenance of the health-related quality of life measures (HRQOL) [1]. Prosthodontic rehabilitation enables head and neck cancer (HNC) patient to optimally restore function, thereby improving and enhancing the oral health related quality of life (ORHQOL) of cancer patients.

Health-related quality of life (HRQOL) is often used to assess clinically significant changes in cancer patients and compare effectiveness of different treatments [5, 6]. However to assess the oral health related quality of life (ORHQOL) of cancer patients, more specific and sensitive measures are required to assess the impact of disease and intervention on quality of life of these patients [7].

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The liverpool oral rehabilitation questionnaire (LORQ) was developed in 2004 and specifically deals to understand the impact of oral rehabilitation in patients with head and neck cancers [8]. LORQ was modified further to LORQ version 3 (LORQv3) which has more detailed questions on oral function and patients' dental and prosthetic status [7].

Oral health impact profile (OHIP) measures people's perception of the social impact of oral disorders on their wellbeing [9]. The aim of this index is to provide a comprehensive measure of self-reported dysfunction, discomfort and disability arising from oral conditions. The OHIP-14 is a shorter version of the OHIP-49 but it retains the original conceptual dimensions contained in the OHIP-49 [9, 10].

The aim of this study is to assess the impact of oral rehabilitation on hundred patients with head and neck cancer with the liverpool oral rehabilitation questionnaire (LORQv3) and the oral health impact profile (OHIP-14).

Materials and Methods

Hundred patients, who did not receive dental rehabilitation before the occurrence of carcinoma and after completion of treatment for head and neck cancers participated in this study. These patients received prosthetic rehabilitation, specifically definitive obturators after 6 months of surgery and 1 year of radiotherapy and others treatments (complete dentures or partial dentures) after 1 year of the completion of their cancer treatment. This study was planned to assess the change in QOL before and after prosthetic rehabilitation without taking into consideration the stage of cancer or its treatment.

All the items in the LORQv3 and OHIP-14 were applicable to the Indian population; hence no attempt to adapt these questionnaires for the local population was done. Individuals who were uncooperative and those with severe complications, such as trismus, that limited the scope for rehabilitation were excluded from the study. General patient information and treatment details were recorded. The study protocol was briefly explained to the participants and informed consent was obtained. Participants were asked to rate their experience of dental problems before fabrication of prosthesis with two questionnaires, the LORQv3 and the OHIP-14 and at follow-up visit after 1 year. The two questionnaires were administered and recorded by single investigator.

The LORQv3 was developed by Pace-Balzan et al. [7] and consists of 40 items divided into two primary sections. The first 17 items assess issues related to oral function, orofacial appearance and social interaction. The remaining items deal with prostheses and patient denture/prosthetic satisfaction. The LORQv3 questionnaire concluded with a

comment section to allow participants to raise those issues that were not addressed and that they felt were an important part of their oral rehabilitation. Items refer to problems or symptoms experienced during the previous week and are rated on a 1–4 Likert scale ranging from never = 1, sometimes = 2, often = 3 and always = 4 [3]. Percentage (%) of patients who said “often” or “always” was calculated.

The OHIP-14 assess seven dimensions of impacts of oral conditions on people's oral health related quality of life (OHRQOL) including functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap [10]. The response format on a Likert-type frequency scale was as follows: very often = 4, fairly often = 3, occasionally = 2, hardly ever = 1, never = 0 [4]. Percentage (%) of patients who said “fairly often” or “very often” was calculated.

Statistical Analysis

Demographic, clinical and disease related variable were presented as frequency (Percentage) and mean (S.D), median as appropriate. Two group comparisons were made using Mann–Whitney U test. Three or more Group comparisons were made using Kruskal–Wallis test. Changes in scores were analyzed using Wilcoxon sign rank sum test. The change in the outcome variable recorded at different time points were analyzed using Friedman test. *P* value < .05 was considered statistical significant.

Results

A total of 100 patients were recruited and rehabilitated in this study. They included 66 men and 34 women with an age range of 14 to 77 years (mean 50 years). They were rehabilitated with complete dentures (26), partial dentures (27), and obturators (47). No patients were lost to follow up after prosthetic intervention. None of the participants had a prosthetic rehabilitation prior to their inclusion in the study.

The site of malignant lesion was 75% in the oral cavity [palate (26%), upper alveolus (14%), buccal mucosa (11%), tongue (10%), gingivo-buccal sulcus (GBS) (5%), lower alveolus (5%) and retromolar trigone (RMT) (4%)], 14% pharynx, 10% larynx and 1% maxillary antrum. Histopathology of the patients included squamous cell carcinoma (74%), adenoid cystic carcinoma (9%), mucoepidermoid carcinoma (4%), Non-Hodgkin's Lymphoma (3%), PNET (2%), ameloblastoma (1%), chondrosarcoma (1%), giant cell carcinoma (1%), leiomyosarcoma (1%), osteosarcoma (1%), myo-epithelial

cell carcinoma (1%), undifferentiated carcinoma (1%), spindle cell carcinoma (1%). Tumor staging noted was T1 in 11%, T2 in 45%, T3 in 10% and T4 in 34%.

Out of 100 patients, 25% of patients underwent surgery, 8% received radiotherapy. Combination of surgery and radiotherapy was done in 30%, surgery and chemotherapy in 2%, surgery, radiotherapy and chemotherapy in 23% and radiotherapy and chemotherapy was done in 12% of patients. The range of the radiation dose received was 40 to 70 Gy.

Table 1 represents the responses to the LORQv3 1-17 items. Before rehabilitation, majority reported problems during social interaction (49%), speech (41%), and chewing (38%), and oro-facial appearance (30%). After prosthetic rehabilitation there was a 10 to 38% improvement noticed in the domain of oral functions: chewing (33%), swallowing (26%), salivation (10%), mouth opening (13%), and speech (38%), orofacial appearance (28%) and social interaction (37%). Statistically significant difference were seen in all the domains of LORQv3 (Table 1) except for social interaction ($P = .451$).

Approximately two third of the participants (74%) had natural teeth in upper or lower jaws (Question 18, 19).

As none of the participants had received prosthesis before treatment, the experience and satisfaction with previous prosthetic interventions were not assessed. Hence, questions 20 to 39 were omitted from the pre-assessment interview (Table 2). After prosthetic rehabilitation no obvious problems were recorded in the prosthesis and patient satisfaction.

In response to the question no 40 (LORQv3), only 15 patients who belonged to the obturator group, brought to notice the problems which were not addressed in the LORQv3 questionnaire namely, problems with sucking,

drooling of saliva during speech, accumulation of food particles between the teeth, weakening of gums or mucosa following treatment, occlusion of teeth.

In the OHIP-14 Questionnaire (Table 3), prior to rehabilitation patients had more problems in the domain of psychological discomfort (29%), functional limitation (26%), physical disability (24%). After 1 year of prosthetic rehabilitation, no problems were seen in the domains of psychological disability, social disability and handicap. Change was noticed in all the domains [psychological discomfort (26%), functional limitation (24%), physical disability (20%), psychological disability (18%), physical pain (17%) social disability (13%), and handicap (11%)].

The internal reliability was .942 OHIP-14 and LORQv3 preoperatively and .939 and .900 for OHIP-14 and LORQv3 questionnaire postoperatively.

Discussion

Improvement in OHRQOL of patients after prosthodontic rehabilitation of head and neck cancer is important for physical, psychological and social well-being of the patients [11–17]. There have been studies documented earlier assessing the HRQOL after oral rehabilitation in head and neck cancer patients [1, 7, 8, 18], however with a small sample size or site specific [18].

This is the first study to evaluate the OHRQOL using a sample size of hundred and a head and neck function specific measure (LORQv3 and OHIP-14) in patients with head and neck cancer. The main objective of this study was to assess patients adaptation and the benefits derived from dental rehabilitation. The results of the current study show

Table 1 Before and after assessment (mean, SD) with p value and percentage difference in scores rated by 100 study participants on LORQv3 questionnaire

| LORQv3 domains | n | Pre | | | Post 1 year | | | P value | % Difference |
|--------------------------------|-----|-----|-------|--------|-------------|-------|-------|-------------|--------------|
| | | % | Mean | SD | % | Mean | SD | | |
| A Oral functions | | | | | | | | | |
| 1 Chewing (1, 2, 16) | 100 | 38 | 2.397 | .7365 | 5 | 1.679 | .6217 | .007 | 33 |
| 2 Swallowing (3, 4) | 100 | 27 | 2.038 | .8709 | 1 | 1.250 | .4301 | .002 | 26 |
| 3 Salivation (5–9) | 100 | 11 | 1.660 | .4432 | 1 | 1.385 | .3875 | .035 | 10 |
| 4 Speech (10) | 100 | 41 | 1.692 | .8376 | 3 | 1.269 | .7243 | .091 | 38 |
| 5 Mouth opening (17) | 100 | 14 | 1.423 | .6433 | 1 | 1.000 | .000 | .005 | 13 |
| B Orofacial appearance (11–14) | 100 | 30 | 2.000 | .9192 | 2 | 1.192 | .4019 | .001 | 28 |
| C Social interaction (15) | 100 | 49 | 2.000 | 1.0583 | 12 | 1.808 | .8953 | .451 | 37 |

n = Total number of patients who answered the questions 1–17

% means the % of patients who had answered “often” or “always” in LORQ questionnaire

% difference means the difference between pre and post 1 year

Table 2 Showing items (20 to 39) of LORQv3 dealing with prosthesis and patients satisfaction after 1 year of prosthodontic rehabilitation

| | LORQv3 Domains | n | Post 1 year | | | % Difference |
|---|--|-----|-------------|-------|-------|--------------|
| | | | % | Mean | SD | |
| E | Patient/prosthetic satisfaction | | | | | |
| 1 | Patients satisfaction (20–25) | 100 | 2 | 1.125 | .1768 | 2 |
| 2 | Maxillary prosthetic satisfaction (26–31) | 82 | 0 | 1.362 | .3881 | 0 |
| 3 | Mandibular prosthetic satisfaction (34–39) | 45 | 0 | 1.449 | .4021 | 0 |

n = number of patients who answered the questions

For Q 20–23 all 100 pts answered

For Q 26–31 (maxillary prosthesis) 82 pts answered as maxillary prosthesis was given to 82 pts (obturators/RPD/CD)

For Q 34–39 (mandibular prosthesis) 45 pts answered as mandibular prosthesis was given to 45 pts (RPD/CD)

Table 3 Before and after assessment (mean, SD), with *p* value and percentage difference in scores rated by 100 study participants on OHIP-14 questionnaire

| | OHIP domains | n | Pre | | | Post 1 year | | | <i>P</i> value | % Difference |
|---|---------------------------------|-----|-----|-------|--------|-------------|-------|-------|----------------|--------------|
| | | | % | Mean | SD | % | Mean | SD | | |
| 1 | Functional limitation (1,2) | 100 | 26 | 1.442 | 1.0893 | 2 | .615 | .8403 | .002 | 24 |
| 2 | Physical pain (3,4) | 100 | 19 | 1.365 | 1.1005 | 2 | .635 | .7424 | .034 | 17 |
| 3 | Psychological discomfort (5,6) | 100 | 29 | 1.365 | 1.3897 | 3 | .769 | .7646 | .052 | 26 |
| 4 | Physical disability (7,8) | 100 | 24 | 1.615 | 1.3734 | 4 | 1.000 | .9274 | .073 | 20 |
| 5 | Psychological disability (9,10) | 100 | 18 | 1.077 | 1.1891 | 0 | .558 | .7256 | .068 | 18 |
| 6 | Social Disability (11,12) | 100 | 13 | .788 | .8506 | 0 | .615 | .7254 | .510 | 13 |
| 7 | Handicap (13,14) | 100 | 11 | .769 | .8744 | 0 | .481 | .7139 | .231 | 11 |

n = Total number of patients who answered the questions 1–14 of OHIP questionnaire

% means the % of patients who had answered “fairly often” or “very often” in OHIP questionnaire

% difference means the difference between pre and post 1 year

improvement in all the domains of the LORQv3 and OHIP-14 questionnaires.

This study is not site specific, and included, patients with malignant lesions of the oral cavity, pharynx and larynx as compared to study by Kadriye Peker et al. [18] where cases of carcinoma of the maxillary sinus and nasopharynx were evaluated.

Liverpool Oral Rehabilitation Questionnaire version 3(LORQv3) was chosen as it specifically deals to understand the impact of oral rehabilitation in patients with head and neck cancers. Assessments with LORQv3 questionnaires after 1 year of prosthodontic rehabilitation showed marked improvement in all the domains. Few patients still complained of issues with social interaction. This can be due to results from surgery/radiotherapy that affected appearance, esthetics, and function.

In the present study, 100% response rate was achieved as this study was conducted by questionnaire based

interviews which were conducted by a single investigator. However, it was noticed with previous studies [7, 8], that the item 17 (difficulty opening mouth) was the most frequently omitted item, probably as a result of its location at the top of page 2 of the LORQv3 questionnaire. Hence in previous studies by Pace-Balzan, less response rate was achieved [1, 7] as the studies were postal survey.

Oral Health Impact Profile (OHIP) measures people’s perception of the social impact of oral disorders on their wellbeing [4]. The aim of this index is to provide a comprehensive measure of self-reported dysfunction, discomfort and disability arising from oral conditions [4, 5]. Assessment with OHIP-14 showed no problems in the domains of psychological disability, social disability and handicap after 1 year of prosthetic rehabilitation. Improvement was noticed in all the domains (psychological discomfort, functional limitation, physical disability,

psychological disability, physical pain, social disability, and handicap).

Conclusions

Based on the responses from the questionnaires administered in this study, the following conclusions were made:

1. For all the items of LORQv3 there was 10 to 38% improvement in function.
2. OHIP-14 showed an 11 to 26% improvements in all the domains.
3. Prosthetic rehabilitation contributed to an improvement of patients with head and neck cancer, in view of the decreased scores on the Likert scale after prosthetic treatment.

Compliance with Ethical Standards

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

Ethics Approval The information provided above is true and to the best of our knowledge.

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