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Oral health-related quality of life in hemimandibulectomy patients with guide flange prosthesis: a prospective study

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Aim: To assess the quality of life in patients who have undergone hemimandibulectomy and rehabilitated with a guide flange prosthesis. **Methods:** This is a prospective study conducted at two time points: immediately after prosthesis delivery and three months after prosthesis use. Forty-four patients who had undergone hemimandibulectomy and were rehabilitated with a guide flange prosthesis were included in the assessment. OHRQol was assessed in these patients using the Obturator Functioning Scale (OFS) and a novel scale Maxillofacial Prosthesis Performance Scale (MFPPS). The scores were obtained 1 week after and 3 months of guide flange prosthesis usage. The data were analyzed using unpaired and paired sample t-tests. **Results:** After 3 months, the results showed significant improvement with the prosthesis. There was a notable improvement in chewing, swallowing, appearance, and psychological issues. The scores of OFS and MFPPS for mandibular guidance prosthesis after 1 week were 25.48 and 26.82, respectively, and scores after 3 months were 20.28 and 13.16, respectively. **Conclusion:** The findings of the study show significant improvement in the scores after prosthesis usage in terms of functional, physical, social, and psychological parameters in the patients after following up.

Keywords: Quality of life. Oral health. Neoplasms. Mandibular osteotomy. Dental prosthesis.

Introduction

Health has been defined by the World Health Organization as a "state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity." Health includes a range of states from wellness to illness to disability. Health lacks a commonly held global measurement. Health status, functional status and health-related quality of life are terms that are often used interchangeably to refer to the health of an individual[1].

Health-related quality of life is a multidimensional concept with five broad domains: opportunity/resilience, health perception, functional states, impairments/diseases, and duration of life. The health-related quality of life approach has provided a greater opportunity for investigation of the interrelations among oral health, health, and related outcomes[2].

One of the most consistently challenging areas of rehabilitation is the maxillofacial rehabilitation of patients who have had radical cancer surgery of the tongue, floor of the mouth, and mandible. Mandibulectomy and commando procedures involve the extensive loss of tissues and associated functions. Swallowing, speech, mandibular movements, mastication, control of saliva, respiration, and psychic functions are adversely affected by radical mandibular surgery. These dysfunctions radically alter the prosthetic prognosis and quality of life of individuals[3].

Over the years, Oral Health–Related Quality of Life has gained enormous impact in cancer patients. However, only a few studies have evaluated the changes in quality of life in maxillofacial defect patients with intraoral prosthesis[4]. Thus, this study was designed to establish the questionnaire system for mandibular defects and evaluate the impact of mandibular guidance prosthesis on OHRQol in mandibular defects by the Obturator Functioning Scale (OFS) and Maxillofacial Prosthesis Performance Scale (MFPPS).

Methods

Study Design

This was a prospective study conducted in the Department of Prosthodontics and crown & bridge, Government Dental college and hospital, Ahmedabad, Gujarat, between September 2023 and January 2024, with approval from the ethical committee. Forty-four patients with Brown's classification were selected for this study. Informed consent was taken from all the participants. The 'inclusion criteria' were hemimandibulectomy defects having a provision of a guidance prosthesis and has worn for at least 2 months. Patients with other facial defects or paralysis and a completely edentulous mandible were excluded from the study. All the patients were rehabilitated with a mandibular guidance prosthesis, respectively. Post maintenance instructions are given, and recalled visits are scheduled periodically. Oral health-related quality of life is measured 1 week after and 2 months of prosthesis function. Patients are asked a series of questions using 2 scales: Obturator Functioning Scale

(OFS-15) and Maxillofacial Prosthesis Performance Scale (MFPPS-10). Answers are recorded by a single operator.

Questionnaires

The Obturator Functioning Scale (OFS) was developed at Memorial Sloan Kettering Cancer Center (New York, NY, USA) as a means of assessing self-reported functioning of an obturator. It was designed by Kornblith et al. to assess eating ability, speech, and cosmetic satisfaction. To rate the items with higher scores (reflecting greater difficulty with obturator function), a 5-point Likert scale was used ("not at all", "a little difficult", "somewhat difficult", "very difficult", "extremely difficult"). One item, i.e., "difficulty talking on the phone", was added to the scale to assess communication difficulties in the absence of visual cues[5].

Maxillofacial prosthesis performance scale (MFPPS) comprises 10 statements which include functional discomfort, retention/stability, phonetics, aesthetics, oral hygiene, saliva, taste ability, psychology, and satisfaction. The data were analyzed using unpaired and paired sample t-tests.

Results

The mean scores of the total 44 patients after 1 week and 3 months of follow-up were 25.48 and 26.82 for OFS-15 and 20.28 and 13.16 for MFPPS-10.

Result of OFS-15

The result of the scale reveals significant improvements in various patient-related outcomes over a period of three months. Specifically, chewing problems ($p < 0.001$), swallowing problems ($p < 0.001$), speech problems ($p < 0.001$), appearance problems ($p < 0.001$), maintenance problems ($p < 0.01$), psychological problems ($p < 0.001$), and other miscellaneous issues ($p < 0.001$) all showed substantial reductions in severity from 1 week to 3 months. Conversely, retention problems significantly increased ($p < 0.01$), indicating a deterioration in retention over time. Leakage problems and taste problems did not exhibit significant changes, with p-values of 0.210 and 1.000, respectively. Overall, the results suggest notable improvements in most areas, except for retention (Figure 1, Table 3).

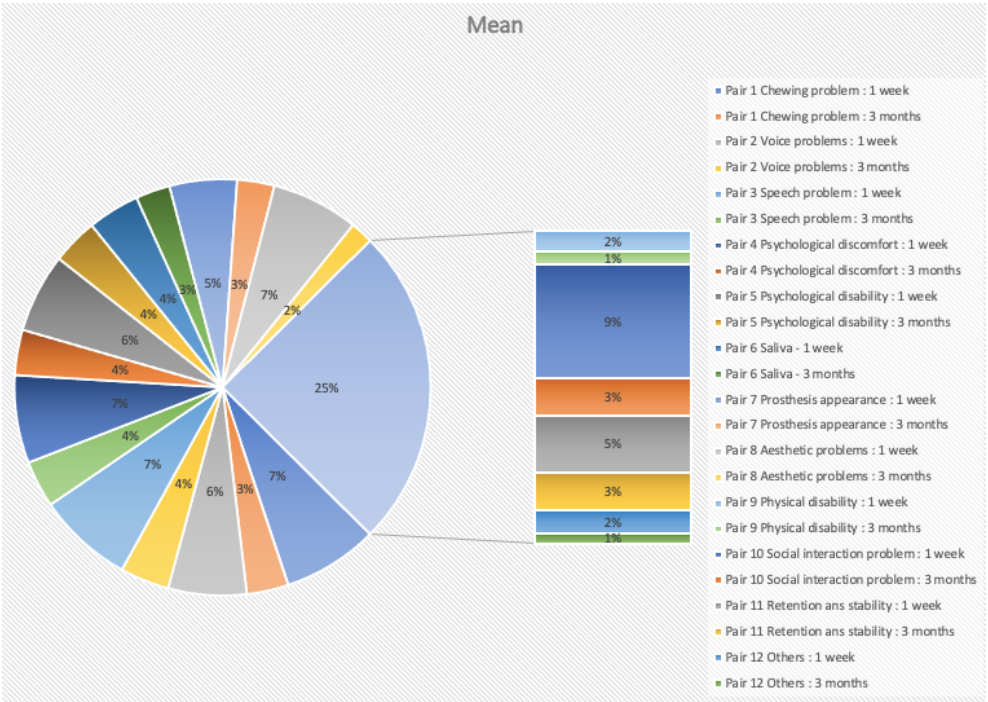

Figure 1. Comparison of OFS-15 score between 1 week and 3 months of prosthesis

Table 1. Obturator Functioning Scale (OFS-15)

No.	Variables	Not at all	A little	Somewhat	Very much	Extremely
1	Difficulty in chewing foods					
2	Leakage when swallowing foods					
3	Voice different from before surgery					
4	Difficulty talking in public					
5	Speech is nasal					
6	Difficulty pronouncing words					
7	Speech is difficult to understand					
8	Difficulty talking on the phone					
9	Mouth feels dry					
10	Dissatisfaction with looks					
11	Clasp on front teeth noticeable					
12	Any area feels numb					
13	Avoidance of family or social events					
14	Difficulty to insert or remove obturator					
15	Upper lip looks funny					

Table 2. Maxillofacial Prosthesis Performance scale (MFPPS-10)

Item	Sr No.	Subscale	Measures: 5-point Likert scale				
			1	2	3	4	5
Functional Discomfort	1.	With respect to chewing, have you had difficulty of chewing of any foods?					
	2.	With respect to swallowing, have you felt any leakage of foods underneath the prosthesis?					
Problems related to Retention & Stability	3.	Do you feel uneasy during meals due to loose & unstable prosthesis?					
Speech Problems	4.	Have you had difficulty speaking in public?					
Aesthetic Problems	5.	Have you had any problem with the appearance?					
Problems with Oral hygiene	6.	Have you had any problem with cleaning/ maintaining your prosthesis?					
Problems related to Salivary control	7.	Have you had problem with drooling of saliva?					
Problems related to Taste ability	8.	Has your prosthesis altered your taste sensation?					
Problems related to Psychological aspect	9.	Have you had any problem with prosthesis that affects your mental well-being?					
Problems associated with General satisfaction	10.	Do you have any dissatisfaction with overall performance of the prosthesis?					

Table 3. Mean, standard deviation of OFS-15 scale after 1 week and 3 months of guidance prosthesis: paired samples statistics

S. No.	Item	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Chewing problem : 1 week	2.98	44	0.590	0.089
	Chewing problem : 3 months	1.30	44	0.930	0.140
Pair 2	Voice problems : 1 week	2.43	44	1.189	0.179
	Voice problems : 3 months	1.52	44	1.110	0.167
Pair 3	Speech problem : 1 week	2.98	44	0.821	0.124
	Speech problem : 3 months	1.45	44	1.088	0.164
Pair 4	Psychological discomfort : 1 week	2.73	44	1.436	0.217
	Psychological discomfort : 3 months	1.41	44	1.127	0.170
Pair 5	Psychological disability : 1 week	2.4545	44	0.95124	0.14341
	Psychological disability : 3 months	1.43	44	0.998	0.150
Pair 6	Saliva - 1 week	1.61	44	1.351	0.204
	Saliva - 3 months	1.07	44	1.169	0.176

Continue

Continuation

Pair 7	Prosthesis appearance : 1 week	2.09	44	1.326	0.200
	Prosthesis appearance : 3 months	1.16	44	1.238	0.187
Pair 8	Aesthetic problems : 1 week	2.70	44	0.632	0.095
	Aesthetic problems : 3 months	0.70	44	0.734	0.111
Pair 9	Physical disability : 1 week	0.66	44	0.805	0.121
	Physical disability : 3 months	0.41	44	0.622	0.094
Pair 10	Social interaction problem : 1 week	3.64	44	0.613	0.092
	Social interaction problem : 3 months	1.16	44	1.010	0.152
Pair 11	Retention and stability : 1 week	1.82	44	0.786	0.118
	Retention and stability : 3 months	1.23	44	0.985	0.149
Pair 12	Others : 1 week	0.73	44	0.544	0.082
	Others : 3 months	0.32	44	0.561	0.085

Result of MFPPS-10

The scores of the index show chewing problems decreased from a mean score of 2.98 at 1 week to 1.30 at 3 months. Voice issues improved, with mean scores reducing from 2.43 at 1 week to 1.52 at 3 months. Speech difficulties saw a reduction from a mean of 2.98 at 1 week to 1.45 at 3 months. Psychological discomfort decreased from 2.73 to 1.41, and psychological disability from 2.45 to 1.43, indicating better psychological well-being. Saliva-related problems reduced from a mean of 1.61 at 1 week to 1.07 at 3 months. Concerns about prosthesis appearance dropped from 2.09 to 1.16, and aesthetic issues from 2.70 to 0.70. Social interaction problems showed a significant decrease from 3.64 to 1.16. Other miscellaneous issues also improved, with scores dropping from 0.73 to 0.32. Minor improvements were observed in physical disability (0.66 to 0.41) and retention and stability issues (1.82 to 1.23). Overall, these results indicate substantial positive impacts on patient satisfaction and quality of life following the interventions (Figure 2, Table 4).

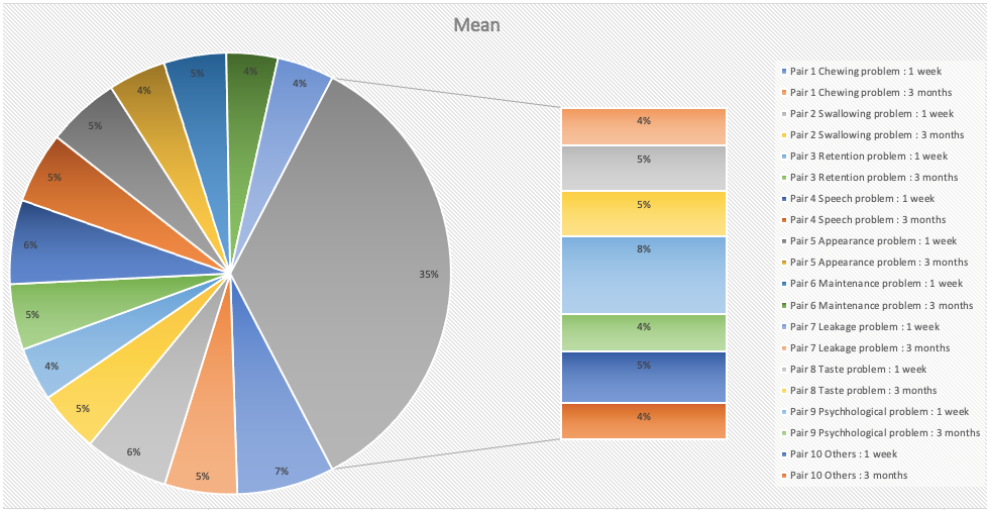

Figure 2. Comparison of MFPPS-10 score between 1 week and 3 months of prosthesis

Table 4. Mean, standard deviation of MFPPS-10 scale after 1 week and 3 months of guidance prosthesis: paired samples statistics

S. No.	Item	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Chewing problem : 1 week	3.27	44	1.065	0.160
	Chewing problem : 3 months	2.43	44	1.021	0.154
Pair 2	Swallowing problem : 1 week	2.82	44	1.040	0.157
	Swallowing problem : 3 months	2.07	44	0.900	0.136
Pair 3	Retention problem : 1 week	1.80	44	0.823	0.124
	Retention problem : 3 months	2.20	44	1.112	0.168
Pair 4	Speech problem : 1 week	2.82	44	0.995	0.150
	Speech problem : 3 months	2.39	44	0.993	0.150
Pair 5	Appearance problem : 1 week	2.43	44	1.228	0.185
	Appearance problem : 3 months	1.93	44	1.065	0.161
Pair 6	Maintenance problem : 1 week	2.09	44	1.158	0.175
	Maintenance problem : 3 months	1.73	44	0.899	0.135
Pair 7	Leakage problem : 1 week	1.91	44	0.772	0.116
	Leakage problem : 3 months	1.82	44	0.691	0.104
Pair 8	Taste problem : 1 week	2.16	44	1.140	0.172
	Taste problem : 3 months	2.16	44	1.140	0.172
Pair 9	Psychological problem : 1 week	3.73	44	1.086	0.164
	Psychological problem : 3 months	1.82	44	0.971	0.146
Pair 10	Others : 1 week	2.45	44	0.975	0.147
	Others : 3 months	1.73	44	0.924	0.139

Discussion

The mandible, a crucial structure in the human skeletal system, plays an integral role in various complex functions of the oral cavity and hypopharynx, including mastication, speech, and deglutition. The mandibular anatomy, with its unique combination of strength and mobility, is essential for these critical actions. Historically, segmental mandibular resection, often necessitated by malignancies, trauma, or severe infections, resulted in significant functional and aesthetic deficits[6].

Patients undergoing such resections frequently faced profound disabilities. The loss of mandibular continuity disrupted occlusion and masticatory efficiency, leading to compromised nutrition and speech difficulties[7]. Additionally, the absence of structural support often caused severe facial disfigurement. These physical impairments were compounded by the psychological impact, as patients struggled with social isolation and reduced quality of life[8].

The primary challenge in the early management of mandibular defects was the lack of reliable reconstructive techniques[9]. Traditional methods were often inadequate in restoring both form and function. The limitations of early grafting techniques, which included high rates of infection, graft resorption, and mechanical failure, rendered many reconstructive efforts unsuccessful[10]. Consequently, patients were left with debilitating conditions that hindered their daily activities and social interactions. The interventions aimed to restore functional balance and improve the quality of life for individuals who have undergone mandibulectomy.

Guidance therapy plays a pivotal role in enhancing both the form and function of individuals who have undergone mandibulectomy or experienced significant occlusal derangements. By providing a structured framework for neuromuscular adaptation, guidance therapy serves as an interim measure to correct existing occlusal discrepancies. This therapeutic approach helps in re-establishing proper occlusal relationships, thereby facilitating more coordinated mandibular movements and improving overall masticatory efficiency[11].

The OFS-15 scores after 3 months showed significant improvement in chewing (25.7%), swallowing (26.6%), aesthetics (20.6%), and psychological well-being (51%) post-treatment. However, retention problems increase (22.2%) after prosthesis usage. Overall, the results reflect positively on the rehabilitative efforts and patient adaptation over time.

The MFPPS score data also indicated the dramatic improvement and positive outcomes associated with the rehabilitative efforts and patient adaptation processes. The results support the effectiveness of the interventions in enhancing patients' quality of life and functional capabilities. The patients were reviewed again 3 months later, confirming an even higher level of overall satisfaction with the mandibular resection prosthesis.

The study concludes that there is a remarkable improvement in prosthesis outcomes in terms of functional, physical, psychological, and social parameters after long-term follow-up (3 months). Significant differences were found in all three scales at both 1 week and 3 months follow-up, indicating that the Mandibular Resection Guidance

Prosthesis significantly enhances oral health-related quality of life. Within the confines of this study, there is a highly positive association between OHRQoL and the use of maxillofacial prosthesis.

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Data Availability

All data generated or analysed during this study are included in this article. Additional datasets are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors report no conflict of interest.

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None.

Author Contributions

Rupal J Shah: Clinical supervision, critical revision of the manuscript, and validation of findings. **Ritika Patel:** Conception of the work, literature review, data collection, data analysis, and manuscript drafting. **Ekta Chheda:** Interpretation of results, and preparation of tables and figures. **Monika Varma:** Methodology design, final manuscript editing, and approval of the version to be published. All authors actively participated in the discussion of the manuscript's findings and have revised and approved the final version of the manuscript.

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