Research article

IMPACT OF MANDIBULAR RESECTION GUIDANCE PROSTHESES ON ORAL HEALTH RELATED QUALITY OF LIFE (OHRQoL) - A PROSPECTIVE STUDY

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ABSTRACT

This prospective study was aimed to measure the impact of mandibular resection guidance prostheses on oral health-related quality of life (OHRQol). A total of 35 patients with mandibulectomy defects were included. All the patients were rehabilitated with mandibular resection guidance prostheses respectively. These patients were subjected for assessment of OHRQol. The assessment was done by using OHIP-Edent-19 and a novel scale—maxillofacial prosthesis performance scale (MFPPS). The assessment was done on all the patients at two weeks and three months of prosthesis function. The scores of OHIP-Edent, and MFPPS for mandibular resection guidance prostheses after two weeks were 33.20and 18.74 respectively. The scores of OHIP-Edent and MFPPS for mandibular resection guidance prostheses prostheses at three months were 27.71and 15.20 respectively.

These findings show significant improvements of prosthesis in terms of functional, physical, psychological and social parameters after long-term follow-up (3 months).

Key Words: Maxillofacial Defects, Oral Health Impact Profile (OHIP), Intra- Oral Prostheses, Guide flange prostheses

INTRODUCTION

Maxillofacial defects result from both congenital and acquired causes leading to significant changes in the anatomic structures of the maxillofacial region[1, 2.] Maxillofacial defects can be classified as maxillary defects and mandibular defects, both need surgical correction and rehabilitation with prostheses. Mandibulectomy involves extensive loss of tissues and associated functions resulting in an inability to masticate efficiently. Functional activities such as mastication, deglutition, phonetics, mandibular movements, control of saliva and psychic functioning are adversely affected post mandibulectomy[3]**.** The greatest challenges faced by maxillofacial Prosthodontist in rehabilitating these conditions include the rate of disease occurrence and financial constraints .They are frequently associated with Functional, Physical, Psychosocial and Esthetic Impairments[4.]

Brown's classification proposal depends upon the standard shape of the mandible having four corners: two vertical corners making the angles of the mandible, and two horizontal corners that are centred at the canine teeth on each side in the dentate mandible, and are roughly 7 mm anterior from the mental foramen in the edentulous jaw. Our proposed mandibular defect classification is logical and simple, and groups defects into categories that can be compared in an understandable way. The use of the corners of the mandible at the angles and the canine regions make this classification system a rational approach to categorise defects, increasing in size and complexity from class I (a simple lateral defect not including the condyle involving the angle or vertical corner) to class IV (which involves at least three corners) and class IVc (which includes total mandibulectomy). The proposed classification system shows the increase in morbidity in terms of aesthetics and function from class I to class IV. This morbidity is likely to increase with non-reconstructed cases in line

with the size of the defect, increasing from 70 mm in class I, 85 mm in class II, 100 mm in class III, and 152 mm in class IV**.** In modern years, Oral Health –Related Quality of Life has gained enormous impact in cancer patients. Evaluation of the treatment success is greatly influenced by the physical and mental strength of the patient[5]**.** This investigated the oral health related quality of life of patients with Mandibular Resection Prosthesis. However, only a few cross-sectional studies have evaluated the change in quality of life in maxillofacial defect patients with intra oral prosthesis. Thus this study was designed to establish and evaluate the Specific Questionnaire Scale system for Maxillofacial Defects (mandibular defects), and to evaluate the Impact of Mandibular Resection guidance Prosthesis on oral health related quality of life (OHRQol) in mandibular defects (Brown's Classification) by Oral Health Impact Profile (OHIP-Edent) and Maxillofacial Prosthesis Performance Scale.

METHODOLOGY

This was a prospective study including patients with acquired mandibular defects having provision of mandibular resection guidance after 3 months, aged between 30 to 75 Years. During the period between 2015 to 2019, a total of thirty-five (35) mandibulectomy patients according to Brown Classification were selected for this study. Informed consent was obtained for all participating patients. Mandibular Resection Prostheses were fabricated in the Author's Department.

The OHRQol was evaluated by means of the Oral Health Impact Profile (OHIP-Edent-19), Obturator functioning scale (OFS-15) and Maxillofacial Prosthesis Performance Scale (MFPPS-10) with standardized questionnaire subsequently at two weeks and three months of prosthesis function for all rehabilitated patients. Patients were asked questions by using all three scales. Answers were recorded by a single operator.

The OHIP-Edent comprises of 19 statements derived from the OHIP using an item impact method (Table 1)**.** Oral Health Impact Profile (OHIP-Edent) which includes seven subscales: Functional limitation, Physical pain, Psychological discomfort, Physical disability, Psychological disability, social disability &Handicap.

To assess the oral health related quality of life for patients with maxillofacial defects Novel scale known as Maxillofacial Prosthesis Performance Scale (MFPPS) was developed. Validity and reliability was tested.

Maxillofacial Prosthesis Performance Scale comprises of 10 statements which includes Functional Discomfort, Retention/Stability, Phonetics, Esthetics, Oral Hygiene, Saliva, Taste Ability, Psychology and Satisfaction (Table 2). Internal consistency of the questions was assessed by Alpha Crohnbach's Test.

Total OHIP –EDENT scores ranged from 1- 95. A five point Likert scale is used and the highest score indicates, function of the obturator prostheses with greater difficulties. Lower scores indicating Maxillo facial prosthesis enhance the oral health related quality of life. Maxillofacial Prosthesis Performance Scale (MFPPS) and the subscales would be calculated by summing the score of the responses to the 10 items and items corresponding to the subscales.Total MFPPS scores range from 1-50. This scales suggest that lower scores indicate significant improvement of oral health related quality of life (OHRQol) with maxillofacial prostheses in terms of their functional, physical, psychosocial and aesthetics parameters.

The collected data were analysed with IBM.SPSS statistics software 23.0 Version. To describe the data descriptive statistics, frequency analysis and percentage analysis were used for categorical variables. Mean & standard Deviation (S.D) were used for continuous variables. The Cronbach's alpha was used to check the reliability, to find the significant difference between the bivariate samples in Paired groups the Paired sample t-test and the Wilcoxon signed rank test was used & for Independent groups the unpaired sample t-test was used. In all the above statistical tools the probability value .05 is considered as significant level.

Table 1: Oral Health Impact Profile –Edentulous (OHIP-Edent)

Domain /Item	S.no	Subscale	5 point Likert				
			1	2	3	4	5
Functional limitation (FL – 3)	1.	Have you had difficulty chewing any foods because of problems with your prosthesis?					
	2	Have you had food catching in your prosthesis?					
	3	Have you felt that your prosthesis not been fitting Properly?					
Physical pain (P1-4)	4	Have you had painful aching in your mouth?					
	5	Have you found uncomfortable to eat any foods because of problems with your prosthesis?					
	6	Have you had sore spots in your spots?					
	7	Have you had uncomfortable dentures					
Psychological Discomfort (P2-2)	8	Have been worried by dental problems					
	9	Have you been self-conscious because of your prosthesis?					
Physical disability (D1-3)	10	Have you had to avoid eating some foods because of your prosthesis?					
	11	Have you been unable to eat with your prosthesis because of problem with them?					
	12	Have you had to interrupt meals because of your prosthesis?					
Psychological disability (D2-2)	13	Have you been upset because of your prosthesis?					
	14	Have you been bit embarrassed because of your prosthesis?					
Social disability (D3-3)	15	Have you avoided going out because of your prosthesis?					
	16	Have you been less tolerant to your partner or family because of your prosthesis?					
	17	Have you been irritable with others because of your prosthesis?					
Handicap (H-2)	18	Have you been unable to enjoy other people company as much because of your prosthesis?					
	19	Have you felt that life in general less satisfying because of your prosthesis?					
TOTAL **OHIP-Edent Score** RANGE (1-95)							

Table 2 : Maxillofacial Prostheses 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 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					
Aesthetics 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?					

RESULTS

The mean score of 35 mandibular resected patients rehabilitated with mandibular resection prosthesis after two weeks and three months of follow up were 33.20 and 27.71 respectively. After 2 weeks of follow up, the mean score of OHIP-Edent subscales such as functional limitation (M=5.77/ 38%), physical pain (M=6.29/ 31.4%), psychological discomfort (M=4.26/42.6%), physical disability (M=5.66/37.6%), psychological disability (M=2.86/ 28.6%), social disability (M=4.57/30.4%) and handicap (M=3.8/ 38%) were observed.

Based on the observation, the most prevalent impact on OHRQol by OHIP –subscale; psychological discomfort (42.5%) specified that nearly half of the patients were upset with dental problems and self-conscious about the prosthesis even after the 2 weeks of follow up. Despite the discomfort in psychological subscale, there was significant improvement in functional limitation (30%), physical pain (26%), psychological disability (28%) and social disabilities (25.8%) after long term follow up. When Analysing OHIP scale, there was highly significant difference (p value = 0.005) were observed in all parameters except for psychological disability, no significant differences (p value = .157) after 2 weeks and 3 months of mandibular resection prosthesis function**.** On long term assessments, OHIP scale scores revealed significant progress on oral health. Psychological discomfort was the most prevalent OHRQol impairment with 36% of the patients followed by handicap (31.7%) and functional limitation (30%). A summary of the results is given in Table 3.

Table 3: Mean, standard deviation of OHIP –Edent scale after 2 weeks and 3 months of Mandibular Resection Prostheses Function

		Mean	N	Std. Deviation	P value	Std. Error mean
Pair 1	FUNCTIONAL LIMITATION 2W	5.77	35	1.942	.0005	.328
	FUNCTIONAL LIMITATION 3M	4.54	35	1.615	.0005	.273
Pair 2	PHYSICAL PAIN 2W	6.29	35	2.080	.0005	.352
	PHYSICAL PAIN 3M	5.20	35	1.471	.0005	.249
Pair 3	PSYCHOLOGICAL DISCOMFORT 2W	4.26	35	1.314	.0005	.222
	PSYCHOLOGICAL DISCOMFORT 3M	3.63	35	1.140	.0005	.193
Pair 4	PHYSICAL DISABILITY 2W	5.66	35	1.924	.0005	.325
	PHYSICAL DISABILITY 3M	4.49	35	1.704	.0005	.288
Pair 5	PSYCHOLOGICAL DISABILITY 2W	2.86	35	.974	.0005	.165
	PSYCHOLOGICAL DISABILITY 3M	2.80	35	.901	.0001	.152
Pair 6	SOCIAL DISABILITY 2W	4.57	35	1.539	.0002	.260
	SOCIAL DISABILITY 3M	3.89	35	1.301	.0005	.220
Pair 7	HANDICAP 2W	3.80	35	1.132	.0002	.191
	HANDICAP 3M	3.17	35	1.098	.0005	.186

p value <.005 significant

Table 4 :Mean, standard deviation of MFPPS after 2 weeks and 3 months of Mandibular Prostheses

		Mean	N	Std.Deviation	Std. Error mean	P value
Pair 1	F/C-2 MFPPS 2W	3.71	35	1.526	.258	.0005
	F/C-2 MFPPS 3M	3.03	35	1.014	.171	.0005
Pair 2	R/S -1 MFPPS 2W	1.89	35	.718	.121	.0005
	R/S -1 MFPPS 3M	1.46	35	.505	.085	.0005
Pair 3	Ph-1 MFPPS 2W	1.86	35	.845	.143	.0005
	Ph-1 MFPPS 3M	1.57	35	.698	.118	.0005
Pair 4	AEST-1 MFPPS 2W	1.74	35	.505	.085	.0005
	AEST-1 MFPPS 3M	1.29	35	.458	.077	.0005
Pair 5	OH-1 MFPPS 2W	2.14	35	.355	.060	.0005
	OH-1 MFPPS 3M	1.43	35	.558	.094	.0005
Pair 6	SALIVA-1 MFPPS 2W	2.11	35	.583	.098	.0005
	SALIVA-1 MFPPS 3M	1.74	35	.657	.111	.0005
Pair 7	TASTE-1 MFPPS 2W	1.89	35	1.132	.191	.0005
	TASTE-1 MFPPS 3M	1.60	35	.736	.124	.0005
Pair 8	PYCHO-1 MFPPS 2W	1.71	35	.825	.139	.0005
	PYCHO-1 MFPPS 3M	1.54	35	.611	.103	.0005
Pair 9	SATIS-1 MFPPS 2W	1.69	35	.471	.080	.0005
	SATIS-1 MFPPS 3M	1.54	35	.505	.085	.0005

DISCUSSION

Masticatory muscle balance and mandibular movements were adversely affected by mandibulectomy, leading to altered masticatory movement and deviation of residual fragment towards the surgical side. Other observed dysfunction was mastication, speech and swallowing and Angular path of opening and closing mandibular pattern. Less precise envelope of motion occurs towards the surgical site during mastication .[6-8] Rehabilitation of mandibular defects after tumour resection is one of the most challenging problems facing maxillofacial prosthodontist. Swallowing, mastication, speech, control of saliva and psychic functioning are most commonly seen adverse effects by Mandibulectomy patients[9-12]. Based on the clinical observation of Rehabilitated Mandibular Patients, the most prevalent impact on OHRQol by OHIP –subscale; Psychological Discomfort (42.5%) specified that nearly half of the patients were upset with dental problems and self-con-

scious about the prosthesis even after the 2 weeks of follow up. Despite the discomfort in psychological subscale, there was significant improvement in functional limitation (30%), physical pain (26%), psychological disability (28%) and social disabilities (25.8%) after long term follow up.

Psychological discomfort was the most prevalent OHRQol impairment with 36% of the patients followed by handicap (31.7%) and functional limitation (30%).Results obtained by the Rehabilitated Mandibular Resected Patients OHIP-Edent scores were also similar to that of Definitive Obturator Prosthesis.

The most ubiquitous impact on OHRQol was problems with appearance. Since a considerable period of time had elapsed after the resection, the acceptance of the guidance appliance was much more difficult for the patient.

Guidance therapy improves form and function of the individuals and it serves as an interim basis for neuro muscular adaptation to correct the existing deranged occlusion. In addition to the above, other factors such as masticatory muscle pull, mandibular deviation and uncoordinated masticatory movements also influence facial disfigurement. Facial aesthetics and oral functions are essential for social interaction and have an impact on individual's OHRQol.

The locations and sizes of the mandibular defect in the present study did not significantly affect HRQOL. On the contrary, Young et al. noted that the site of resection appears to have an impact with posterior resections involving the mandibular angle having the most adverse effects on appearance and those involving the parasymphysis (lateral) having the most deleterious effect on overall QOL. Young et al. and Rogers et al have also concluded that resections involved in parasymphysis deleterious effect on mastication, lip support and aesthetics. Our study observations were similar with Young and Rogers et al studies and it is likely that these factors contributed to significant impairment in OHRQol [13-15] .When analysing the MFPPS score of rehabilitated Mandibulectomy patients after 3 months' improvement for various dimension were, psychological aspects (M=1.54/30.8%), aesthetics (M=1.29/25.6%), taste ability (M=1.60/32%) oral hygiene (M=1.43/28.4%), general satisfaction (M=1.54/30.8%) and saliva control (M=1.74/34%). Highest score was recorded for problems with saliva control (34.8%) followed by general satisfaction and psychological aspects (30.8%). This may be due to problems in speaking and chewing and alterations in appearance may have been frequently reinforced by a range of strained and negative social interactions with others. Due to loss of function and unpleasant appearance which leads to markedly restrict patient's normal social activities.

When comparing maxillofacial defect rehabilitation with conventional prosthesis, it may possess many challenges to enhance the oral health quality of life in restoring the maxillofacial defect. This may be successfully achieved through sound theoretical knowledge, appropriate surgical technique, and surgical skill of the operator, maxillofacial prosthetic experience and team approach. Precise treatment planning and designing in fabrication of intra oral prostheses could certainly enhance the Quality of life of patients with maxillofacial defects. There is significant improvement in mastication, speech, deglutition and appearance after rehabilitation with maxillofacial prostheses. Therefore, it is an essential pre-requisite for oro-facial defects which in turns support the patient in resuming their normal social life.

CONCLUSION

The study concludes a remarkable improvement of prosthesis in terms of functional, physical, psychological & social parameters after long term follow-up (3 months). After 2 weeks and 3 months' follow-up, where Mandibular Resection Guidance Prosthesis showed highly significant differences were found in all three scales. There was a significant improvement of oral health related quality of life in terms of Functional, Physical, Psychological and social aspects. Within the confines of this study, a highly positive association exists between OHRQol and Maxillofacial Prosthesis

Ethical Consideration: The Study protocol and informed consent form were approved by the ethical committee of the Vinayaka Mission's Research Foundation, Salem, (OHIP-Edent-19) and Tamilnadu, India. (Ref: VMSDC/IEC/Approval no.069, dated: 15/7/2016)

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