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Assessment of obturator functioning in Kashmiri patients rehabilitated with an obturator prosthesis post hemi-maxillectomy: A cross-sectional study

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Abstract
Since the incidence of oral cancers on rise especially in developing countries like India, it becomes prime duty of the professionals to focus on improving the overall patients' health-related quality of life This can be achieved by proper prosthodontic intervention during surgical management of such patients. Obturators have proven to be non-invasive and simple methods for restoring the continuity of the defects in patients who have undergone resection for oral tumors. Our study aimed to assess the obturator functioning in patients with hemimaxillectomy using obturator prostheses. This study was conducted at department of Prosthodontics govt dental college Srinagar Kashmir J&K India. 50 hemimaxillectomy patients were included in the study. A questionnaire 'Obturator Functioning Scale' was administered to these patients after 6 months of definitive obturator use. The responses to all the questions were recorded on a 5-point Likert scale. The problems encountered by the patients with the use of obturators were presented in the form of frequency and percentages.
Results showed that maximum patients 42 (84%) experienced difficulty in chewing food with their obturator prostheses patients. A total of 34(68%) patients experienced leakage while swallowing food with their obturator prostheses, 20(40%) patients experienced a difference in voice from before surgery with their obturator prostheses in place, 12(24%) had difficulty in talking in public, 9(18%) patients had nasal speech and 10(20%) patients had difficulty in pronouncing words. There were 7(14%) patients who had speech that was difficult to understand, 4(8%) patients had difficulty in talking on phone, 30(60%) patients had dry mouth, 21(42%) patients were dissatisfied with their looks, 14(28%) patients had noticeable clasps on front teeth visible, 24(48%) patients avoided family, 29(58%) patients had difficulty in inserting the obturator and 20 (40%) patients experienced a funny looking upper lip. Patients reported the least difficulty with numbness in the upper lip (4%).Our study concluded suggest that for majority of hemimaxillectomy patients the most common problems related to obturator functioning are difficulty in mastication, insertion, swallowing and dryness of the mouth. Obturator prosthesis serves the functions of speech and esthetics very well but it is not very efficient in terms of mastication and swallowing.

Keywords: Obturator, Hemimaxillectomy, quality of life, oral cancers, satisfaction, Kashmiri population

Introduction
Cancer burden has increased worldwide due to population growth, aging, and an increase in the prevalence of risk factors such as smoking, obesity, and dietary patterns [1]. Approximately 5% of all cancers involve structures of the mouth, tongue, oropharynx, nasopharynx, and larynx [2-4] and oral cancer is the most common type among head and neck cancers [5]. The annual estimated incidence is around 275,000 and two third of these cases occur in the developing countries. In South Asia the highest incidence of oral cancers is seen in countries like India, Pakistan and Sri Lanka [6] and the gold standard for treatment of these cancers is the surgical resection [7]. Surgical reconstruction may be the treatment choice to restore the integrity or continuity of the affected structure after the resection; however, it may not always be possible especially when the tumors are large [8]. After resection of such maxillofacial tumors, patients have to deal with a lot of functional and emotional problems that might have significant negative effects on the health related quality of life of patients and their caregivers. In the management of such maxillary defects, obturator prosthesis is the most commonly used noninvasive approach to restore the patient's oral functions, aesthetics, and resocialization [9-11]. Maxillary obturator prosthesis provides a quick and adequate prosthetic rehabilitation in older patients, patients with a high morbidity rate, and patients with an unfavorable life expectancy [12].

It is an equivalent reconstructive option for improving health related quality of life (HRQOL) and reducing complications in patients undergoing total or extended maxillectomy for advanced malignancy [13]. The main aim for prosthetic rehabilitation of such patients is the separation of the oral and nasal cavities to allow adequate deglutition and articulation and also to restore the mid facial contour and to provide acceptable results [13-14]. Recognizing the importance of oronasal functions on HRQOL outcomes, the obturator functioning scale (OFS) was developed at the Memorial Sloan Kettering Cancer Center with the aim to assess the self-reported functioning of and satisfaction with the obturator prosthesis in maxillectomy patients [14]. It provides a subjective measurement of the degree to which an obturator restores the needs of a patient on functional level taking patient's perspective into account. It is used more frequently than the objective measures because of its simplicity and low cost [17]. This scale consists of 15 questions to measure patient's ability to eat and speak with obturator prosthesis and their satisfaction with the restoration of lip position and its cosmetic effects. All items are then rated on a 5-point Likert scale[18].However, to our knowledge, there are no published studies evaluating the functioning of the obturator and the satisfaction of Kashmiri patients with obturator prostheses after maxillectomy. In addition, there are six different classes of maxillectomy [19] and, the results are expected to be different in different types of defects. Therefore, the aim of the present study was to subjectively assess obturator functioning in a more homogenous sample including only hemi-maxillectomy patients in Kashmir J&K India.

Materials and Methods

Fifty patients who had undergone hemi maxillectomy and been rehabilitated with obturator prostheses at the department of Prosthodontics govt dental college Srinagar Kashmir j & K India, were recruited to participate in this cross-sectional study. Patients were selected consecutively during their annual checkup visits to our hospital between January 2016 and November 2017. The inclusion criteria for the patients were (1) age 35-50 years who had undergone hemimaxillectomy for maxillary neoplasm, (2) use of a definite obturator prosthesis for at least 6 months, (3) dentate lower arch and at least 4-7 standing teeth on the opposite side of the upper arch, (4) having a clinically and functionally acceptable prosthesis, according to the criteria defined by Beumer *et al* [20], including consideration of efficiency of mastication, air and liquid leakage into the nasal cavity, and speech, (5) being disease-free at the time of the questionnaire; and (6) an adequate level of literacy to complete the questionnaire. Patients with a history of mental illness; with cleft lip and palate, completely edentulous patients and patients having traumatic defects were excluded from the study.

Procedure

The study was approved by the Ethical Committee of the hospital. Informed consent was obtained from each patient who agreed to participate before he or she filled out the questionnaires. The OFS was translated from English to kashmiri by 2 native kashmiri-speaking translators experienced in translation of health questionnaires. The OFS comprised 15 questions including difficulty in chewing, leakage while swallowing, voice difference from before surgery, difficulty in talking in public, nasal speech, difficulty in pronouncing words, speech difficult to understand, difficulty in talking on phone, dry mouth, dissatisfaction with looks, noticeable clasps, numb upper lip, avoidance of family and social events, difficulty in inserting the obturator and funny looking upper lip. Response categories ranged from 1 to 5. Points 1 and 2 stood for 'not at all difficult' and 'a little difficult' on the scale and were considered as 'No Difficulty'. Points 3, 4 and 5 stood for 'somewhat difficult', 'very much difficult' and 'extremely difficult' respectively and were considered as 'Difficulty'. Patients response from 1-2 were considered as 'No difficulty' and 3-5 were considered as having 'Difficulty'. The scores on the Likert scale were inversely proportional to the functioning of the obturator. Higher scores indicated worse obturator functioning and poorer patient satisfaction.

SPSS software version 20 was used to analyze the data. The Demographic variables (age and gender) were analyzed using Simple Descriptive Statistics. Age was presented by calculating Mean ± S.D. Gender and obturator functioning were presented by using frequency and percentages.

Results

The Sociodemographic and clinical characteristics of patients are shown in TABLE I. The mean age of patients was 42.36±6.15. Of the study patients, 62% (n=31) were men, & 38% (n=19) were females. 80% were married and 62% (n = 31) had formal school education equal to or less than 8 years.

Table 1: Sociodemographic characteristics of patients (n = 50)

Characteristics		n (%)
Gender	Male	31(62%)
	Female	19 (38%)
Marital Status	Married	40 (80%)
	Single	10 (20%)
Employment status	Employed	21 (42%)
	Unemployed	29 (58%)
Educational level	<8 years of schooling	31 (62%)
	>8 years of schooling	19 (38%)
Age Mean ± SD		42.36±6.15

SD- Standard deviation

Results of the questionnaire (Table 2) showed that maximum patients; 42 (84%) experienced difficulty in chewing food with their obturator prostheses patients and 8(16%) of the patients had no difficulty in chewing with their obturator prostheses in place. A total of 34(68%) patients experienced leakage while swallowing food with their obturator prostheses, 20(40%) patients experienced a difference in voice from before surgery with their obturator prostheses in place, 12(24%) had difficulty in talking in public, 9(18%) patients had nasal speech and 10 (20%) patients had difficulty in pronouncing words. There were 7 (14%) patients who had speech that was difficult to understand, 4(8%) patients had difficulty in talking on phone, 30(60%) patients had dry mouth, 21(42%) patients were dissatisfied with their looks, 14 (28%) patients had noticeable clasps on front teeth visible, 24 (48%) patients avoided family, 29(58%) patients had difficulty in inserting the obturator and 20 (40%) patients experienced a funny looking upper lip. Patients reported the least difficulty with numbness in the upper lip (4%).

Item-based analysis showed that patients with greater than 8 years of schooling reported more problems with leakage when swallowing foods (P =.034) and problems with clasps on front teeth compared with those with 8 years of schooling or less (P =.023). Females reported more problems with inserting the obturator prosthesis than males.

Table 2: Obturator Functioning Scale (OFS)

		n(=50)	% age
Difficulty in Chewing	Yes	42	84
	No	8	16
Leakage when swallowing	Yes	34	68
	No	16	32
Voice difference from before surgery	Yes	20	40
	No	30	60
Difficulty in talking in public	Yes	12	24
	No	38	76
Have nasal speech	Yes	9	18
	No	41	82
Difficulty in pronouncing words	Yes	10	20
	No	40	80
Speech difficult to understand	Yes	7	14
	No	43	86
Difficulty in talking on phone	Yes	4	8
	No	46	92
Mouth feels dry	Yes	30	60
	No	20	40
Dissatisfied with looks	Yes	21	42
	No	29	58
Clasps on the front teeth are noticeable	Yes	14	28
	No	36	72
Upper lip feels numb	Yes	2	4
	No	48	96
Avoids family events	Yes	24	48
	No	26	52
Difficulty in inserting obturator	Yes	29	58
	No	21	42
Upper lip looks funny	Yes	20	40
	No	30	60

Discussion

Maxillectomy patients often deal with severe functional problems related to mastication, deglutition, and speech. In addition, changes in appearance, psychosocial functioning, and vocational status might affect the quality of one's life after surgery [21, 22]. Often, reconstructive surgery alone is not enough to restore the defects, especially when a defect is relatively large; hence, prosthetic reconstruction must be employed [23]. An obturator is a maxillofacial prosthesis that is used to close and maintain the integrity of the oral and nasal compartments that are altered because of a congenital, acquired, or developmental disease [24]. Obturator functioning can be assessed both objectively and subjectively. Objective assessment is performed by the operator and requires the use of advanced scientific equipment. Functioning of the obturator can be subjectively assessed by using the Obturator Functioning Scale [25].

The present study assessed the functioning of obturator in 50 patients with hemimaxillectomy using obturator prosthesis. In this study the mean age of patients was 42.36±6.15 years, similar findings of different studies regarding age of patients was reported by Khan *et al* [25] who reported a mean age of 41.7±6.25 years and Kornblith *et al* [16] with mean age of patients as 59.9±15.4 years. In another study by Rieger *et al* [26] the mean age was 60.7±15.3 years 8. Male prepondence was reported in our study comprising 62% of the study sample. Moreover the study by Kornblith *et al* [16] shows a similar pattern of gender distribution with 66% males in their study sample. However, Rieger *et al* [26] and Irish *et al* [16] both show a female predilection in their study samples with 60% and 71% females respectively. The possible reason for male pre dominance in the present study could be attributed to the fact that males are more predisposed to oral cancers due to more exposure to carcinogenic agents like tobacco and beetle nut chewing. Moreover females are a bit reluctant when it comes to regular follow ups and annual visits in this part of country hence contributing to lessened percentage in the study sample. Our study also showed that patients with less than 8 years of schooling reported significantly better obturator functioning, less difficulty swallowing solid foods, lower dissatisfaction with noticeable clasps compared with those with 8 years or more of schooling, and older patients had more problems with insertion of their prostheses. This can be explained by the fact that patients with higher education level would be more concerned with their health and aware of their body image [27, 28]. In comparison to previous studies [12, 16, 26], our patients reported more problems with chewing (84%), but less than those reported by Khan *et al* [25]. The possible reasons behind this mismatch between the results of previous studies and this study may be the fact that in the present study homogenization of the defect type and size was done taking only hemi maxillectomy patients into the study where as previous studies have not specified any type. The percentage of patients who had leakage while swallowing was also higher (68%) in our study compared with previous studies [16, 25, 26, 29]. This problem was 2nd most common of all those asked from the patient. Thus leakage while swallowing is a great concern in the patients with hemimaxillectomy even with their obturators in place. 60% of the patients in the present study suffered from dry mouth and this problem ranked the third greatest problem for hemimaxillectomy patients. The possible reason behind this may be the post-operative radiotherapy given to these patients for the cure of cancer. In the study by Kornblith *et al*. [16] 51% of patients had this problem. Irish *et al*. [8, 11] and Rieger *et al* [26] reported the percentages for the same problem to be 45% and 38% respectively. It was also seen that 40% of the patients in the present study experienced some difference in their voice from before surgery which was higher than the previous studies [16, 18, 25, 26, 29]. It should be noted that our patients experienced more difficulty inserting their obturators (58%) than that reported in previous studies [25]. Moreover we found 24% of all the patients had difficulty in talking in public,18% complained of having nasal speech, 20% patients were having difficulty in pronouncing words. These results were in agreement with, Kornblith *et al* [16], Irish *et al* [16], khan *et al* [25] and Rieger *et al* [26]. Speech being difficult to understand was seen in 14% of the patients in the present study which is higher from previous studies [16, 18, 26]. We found that only 8% of the patients had difficulty in talking on phone similar to khan etal [25] (4%) suggesting that this is not a great concern for most of the patients. In addition to these, 42% patients were dissatisfied, with their looks, (28%) patients had noticeable clasps on front teeth, 48%) patients avoided family, and 40%) patients experienced a funny looking upper lip similar to khan etal [25] but higher than previous studies [16, 18, 26]. The greater percentage in the present study may be due to the fact that all the patients in this study were adults to elderly age group. These patients were quite conscious of their disability and psychosocially affected by their disease. Numbness in lip was the least reported complaint contributing to only 4% of the sample similar to karatas *et al*. [29] (2.4%). The differences between the results of earlier studies and this study may be attributed to the patient-related characteristics (e.g., clinical, psychological, and psychomotor factors and social and cultural beliefs).

Conclusion

It can be concluded from the present study that for majority of

hemimaxillectomy patients the most common problems related to obturator functioning are difficulty in mastication, insertion, swallowing and dryness of the mouth. Hence a Prosthodontist should focus on these aspects so as to improve the overall functioning of the prosthesis and satisfaction of the patient.

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