

Some Unfavorable Intraoral Features in Edentulous Patients Reporting For Complete Denture Treatment at the Prosthodontics Department of a Teaching Dental Hospital

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Abstract:

Introduction & Objectives: To gain an insight into the prognosis of complete denture treatment, the dental practitioner must be familiar with the anatomical and physiological condition of edentulous mouth of each individual patient. This study reports frequencies of some common unfavorable intra-oral features in edentulous patients reporting for complete denture (CD) treatment at the Prosthodontics Department, Khyber College of Dentistry (KCD) Peshawar (Pakistan).

Methodology: This was a descriptive, cross sectional study conducted during the period from February 2011 to February 2013. Using pre-structured data collection sheet, information of some unfavorable intraoral features of edentulism was recorded from patients seeking consultation for complete denture therapy in both jaws for the first time. History, clinical and radiographic examinations were the method for assessing the unfavorable intraoral features including mandibular bone height, maxillary residual ridge morphology, pattern of muscle attachment and maxillo-mandibular relationship.

Results: Mean age was 61.8 ± 9 years with male to female ratio of 1.27. Patients easy-to-treat with conventional CDs were 43 (27%) as compared to 116 (73%) who were difficult-to-treat. The frequencies of unfavorable features including mandibular bone height, maxillary residual ridge morphology, pattern of muscle attachment and maxillo-mandibular relationship were 60 (37.7%), 40 (25%), 54 (34%) and 55 (34.6%) respectively. Females had significantly reduced mandibular bone height.

Conclusion: The high frequency of unfavorable intraoral features suggests screening of edentulous patients for knowing their levels of treatment complexity with conventional complete dentures.

Keywords: Edentulism, Anatomical landmarks, Edentulous patients classification, Complete denture treatment complexity, Complete denture prognosis

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Introduction

Edentulous state presents a compromise in the integrity of masticatory system along with adverse functional and esthetic sequelae¹. The oral and general health of most edentulous patients can be improved by the provision of conventional or implant

supported complete dentures.² Evidence exists that despite projections of declining edentulism, the need for prosthodontic treatment will remain high because of an increase in the life expectancy.³ And the need for conventional complete dentures will be even higher because of compromised medical and

psychological states and financial constrains for implant supported prosthesis.⁴

The satisfaction of edentulous subjects with the wearing of conventional complete dentures (CDs) is influenced by an interplay of anatomical, biological, constructional, social and psychological factors.⁵⁻⁷ Removable dentures are retained and supported over denture supporting tissues which comprise of residual edentulous ridges of maxilla and mandible, the surrounding muscles and connective tissue with its covering epithelium.^{8,9} Without recognizing the features of relevant anatomical and pathological conditions of a subject's denture supporting tissues, knowing the prognosis of CD prosthesis is unlikely.¹⁰ Thus, dental practitioners should be familiar not only with the technical aspects of denture construction but also with the anatomical, physiological and psychological conditions of each patient as well.^{11,12} Several important diagnostic factors when treating edentulous subjects with conventional CDs have been identified. These include; mandibular bone height, maxillary residual ridge morphology, level of muscle attachment, maxilla-mandible relations, need for pre prosthetic surgery, inter-arch space, tongue anatomy and systemic modifiers of oral tissue health.¹³ According to previous studies the prevalence of unfavorable mandibular bone height, pattern of muscle attachment to mandibular denture bearing area, maxillary residual ridge morphology and maxilla-mandibular relationship was found 67%, 47%, 67% and 9.2% respectively.¹³⁻¹⁵ According to American College of Prosthodontics (ACP) classification for complete edentulism, the presenting complexity of treatment has been estimated as more than 84%.¹³ Recently a local study involving 100 subjects has highlighted the need for specialist services because of high proportion of unfavorable features in edentulous maxillary denture supporting tissues⁷. It has been suggested that a thorough assessment of biological environment will provide opportunities for improvement in the treatment of edentulous subjects.¹²

The present work is being conducted to report, in edentulous subjects, the frequencies of some common unfavorable intraoral features that could

make treatment with conventional CD difficult. This will provide local data about the extent of treatment complexity related to patient's treatment with conventional CDs. This data will also be helpful for use and consideration by dental practitioners in assessing the level of difficulty and identifying cases requiring referral to specialists so that special techniques can be used and to enhance the success of CD therapy.

Subjects and Methods

For the purpose of this study complete edentulism referred to the state when there were no natural teeth in both the maxillary and mandibular jaws of a subject detected by naked eye examination. Similarly, common unfavorable intraoral features to record included the following;

- i. Unfavorable mandibular bone height: as measured on a panoramic radiograph from the alveolar crest to inferior border of the mandible at a location showing least vertical height. When this was < 21mm it was considered as unfavorable.
- ii. Unfavorable maxillary residual ridge morphology: was determined by naked eye examination and palpation. The maxillary ridge morphology was considered unfavorable when it was not square to round in shape with parallel walls and rounded crest, depth of buccal, labial vestibule less than 7.5mm and presence of tori alone or in combination.
- iii. Unfavorable pattern of attachment of muscles to the mandibular denture bearing area. This was determined by naked eye examination. When the distance between the attachment and the crest of the ridge was less than 0.5 inches it was considered unfavorable.
- iv. Unfavorable maxilla to mandible relationship. This was determined by naked eye examination from the front and lateral view of patients' facial profile as well as examination of the alveolar ridges. When the mandible was retrognathic (>2mm posterior in relation to the maxilla) or prognathic (anterior in relation to the maxilla) it was considered unfavorable.

A total 159 edentulous patients comprised the required study sample as calculated by using 9.2% proportion of the unfavourable maxilla-mandible relationship¹³, 95% confidence level and 4.5% margin of error using WHO software for sample size determination. The study was approved by the institutional research evaluation unit. A consecutive (non probability) sampling technique was used data collection from subjects who fulfilled the study inclusion and exclusion criteria given below:

Inclusion criteria: Subjects who were adult males / females with ages above 30 years and seeking consultation for complete denture therapy in both jaws for the first time.

Exclusion criteria: Subjects who were dentate or partially dentate or having one jaw edentulous, had undergone pre-prosthetic surgical corrective work / implant therapy and those who had undergone maxillectomies or mandibulectomies, fractures, patients with cleft lip and palate and patients with congenital / hereditary oral abnormalities. These latter mentioned conditions were considered confounders and their inclusion would have introduced bias in the results.

Subjects referred from general out-patients-department (OPD) fulfilling the inclusion criteria were included. Complete history was recorded. using a structured proforma developed for the study. Clinical examination including inspection, palpation was performed for mandibular bone height, maxillary residual ridge morphology, pattern of muscle attachment to the mandibular denture bearing area and maxilla-mandibular relationship. Panoramic radiographs were done for all the patients to measure the mandibular bone height. An impression of the mandibular edentulous jaw of each subject was also taken using edentulous stock tray. Estimated functional depth of the sulci was outlined on the impression and cast was prepared. Distance between the crest of the alveolar ridge and muscle attachments were measured using flexible plastic mm-ruler and data were entered in the proforma. All the information was collected by the principal author (SS) under the direct supervision of senior consultant (FG) to achieve consistency and reliability.

The data collected were analyzed using SPSS version 17. Descriptive statistics were made to compute the mean ages $\pm$ standard deviation (SD) of the subjects. Frequencies and percentages were calculated for common unfavorable intraoral features in patients presenting for CD treatment. For gender male to female ratio was calculated. Unfavorable intraoral features were stratified among the age and sex to see the effect modifiers

Results

The mean age of the subjects was 61.8 ± 8.95 (SD) years. The distribution of subjects in the various age groups including their gender is shown in Table 1. One patient had 120 years age. Males were 89 (56%) and females as 70 (44%) with a ratio of 1.27. Majority of patients i.e. 119 (75%) were in the age group 50-70 with 65 (55%) males and 54 (45%) females.

The distribution of patients on the basis of their CD treatment complexity is given in Table 2. The distribution of the CD treatment complexity in the various age groups is given in Table 3. The data for the treatment complexity in the two gender groups is given in Table 4. Table 5 details the distribution of the various unfavourable and favourable aspects of edentulism for treatment with CDs.

The distribution of the unfavourable features of edentulism in the various age groups is given in Table 6. Table 7 shows the data for the unfavourable aspects in male and female patients. Inspection of the data in Table 8 shows that out of the 116 (73%) difficult-to-treat patients, 55 (47.4%) had one unfavourable landmark, 35 patients (30.25%) had two, 20 (17.25%) had three, while 6 (5.1%) patients had all the mentioned landmarks as unfavourable at a time.

Table 1: Age groups & gender distribution.

Age Group	No. of males	No. of females	Total No. (%)
40-49 yrs	3	6	9 (6)
50-59 yrs	17	30	47 (30)
60-69 yrs	48	24	72 (45)
70-120 yrs	21	10	31 (19)
Total	89	70	159 (100)

Table2: Treatment complexity.

Treatment Complexity	No. (%)
Easy	43 (27)
Difficult	116 (73)
Total	159 (100)

Table 3: Treatment complexity in the various age groups.

Age Group	Easy-to-treat	Difficult-to- treat
40-49 yrs	2	7
50-59 yrs	10	37
60-69 yrs	22	50
70-79 yrs	9	22
Total	43	116

P value: .051

Table 4: Treatment complexity in the male & female groups.

Gender	Easy-to=treat	Difficult-to- treat
Male	25	64
Female	18	52
Total	43	116

P value: .73

Table 5: Distribution unfavourable and favourable aspects of edentulism.

Aspect	Unfavourable No. (%)	Favourable No (%)
Unfavourable Mandibular Bone Height.	60 (37.7)	99 (62.3)
Maxillary residual ridge morphology.	40 (25.0)	119 (75.0)
Unfavorable pattern of muscle attachment.	54 (34.0)	105 (66)
Unfavorable maxilla-mandible relationship	55 (34.6)	104 (65.4)

Table 6: Distribution of unfavorable & favourable features in the various age groups.

Age group (Yrs)	Unfavorable mandibular bone height		Unfavorable maxillary residual ridge morphology		Unfavorable muscle attachment		Unfavorable maxilla-mandible relation	
	Yes	No	Yes	No	Yes	No	Yes	No
40-49	5	4	2	7	3	6	2	7
50-59	20	27	14	33	14	33	16	31
60-69	23	49	14	58	25	47	24	48
70-79	12	19	10	21	12	19	13	18
Total	60	99	40	119	54	105	55	104
P-value	.265		0.64		0.78		0.74	

Table 7: Distribution of unfavourable & favourable features in male and female gender.

Gender	Unfavorable mandibular bone height		Unfavorable maxillary residual ridge morphology		Unfavorable muscle attachment		Unfavorable maxilla-mandible relation	
	Yes	No	Yes	No	Yes	No	Yes	No
Male	27	62	25	64	25	64	29	60
Female	33	37	15	55	29	41	26	44
Total	60	99	40	119	54	105	55	104
P-value	0.030		0.337		0.078		0.549	

Table 8: Distribution of Combinations of unfavourable Features.

Combination of unfavorable features	No.
Easy (nil)	43
Difficult (Nil)	55
1 + 2	4
1 + 3	13
1 + 4	6
2 + 3	2
2 + 4	5
3 + 4	5
1 + 2 + 3	8
1 + 2 + 4	1
1 + 3 + 4	10
2 + 3 + 4	1
1 + 2 + 3 + 4	6
Total	159

1: Unfavorable mandibular bone height, 2: Unfavorable maxillary residual ridge morphology, 3: Unfavorable muscle attachment to mandibular denture bearing area, 4: Unfavorable maxilla-mandible relation.

Discussion

In the edentulous mouth, changes are progressive including changes accompanied with tooth loss and changes caused from aging. Major changes will be seen as altered functions, changes in the shape of soft tissues and bony ridges. Success in CD treatment is often directly related to the health and condition of the hard and soft tissues that make up the denture-bearing area. Consequently, in planning for CD making, the oral environment must be observed closely in patients. And the degree of difficulty in each part of the mouth must be assessed in advance. A thorough assessment of biological environment will provide opportunities for improvement in the treatment of edentulous subjects. A critical aspect of defining the scope of practice for a prosthodontic specialist is the

ability to differentiate, on a diagnostic level, those patients and / or procedures that require additional skills and training.

The present study has provided local data about the extent of treatment complexity related to patient's treatment with conventional CDs. It will also prove helpful for use and consideration by dental practitioners in assessing the level of difficulty and assessing cases requiring referral to specialists so that special techniques can be used.

The mean age of reporting edentulous patients (61.8 ± 8.95) is consistent with another study.^{16,17} There was an over representation of age groups >61 in our study population. Largest proportion (75%) of the patients

was of age group II and III (50-69 Years) indicating that patients reporting for treatment would be within this age group. Hence, these age groups have risk factors that might be responsible for their need of dentures. This age related changes may not be unconnected with the deteriorative physiological changes noticed after adolescence and which gets worse with increase in age. This could also be due to the fact that the mean life expectancy of people in the area is also within the age limits set in this group.

No gender relationship with denture demand was noted this in study having a male to female ratio of 1.27. This study shows the equal level of tooth loss in both sexes which is not consistent with other studies¹⁸⁻²⁰ which have shown higher proportion of edentulism in females. This difference might be due to cultural values imposing restriction on free movement of females in this part of the world. The results might have been different had the study setting been the community rather than teaching dental hospital.

The frequency of difficult-to-treat patients was 73% which is consistent with another study which shows the same percentage of difficult-to-treat patient. A patient was considered difficult-to-treat when the features of complete edentulism included in this study i.e. mandibular bone height, maxillary residual ridge morphology, pattern of muscle attachment to mandibular denture bearing area and maxilla-mandible relation were unfavourable. An unfavorable features can be present alone or in combination with others. Presence of a single unfavorable feature places patient in the difficult-to-treat category.¹³

The frequency of unfavorable mandibular bone height (37.7%) and pattern of muscle attachment to mandibular denture bearing area (34%) is not consistent with another study. This may be the result of difference in the sample size, mean ages of the population, duration of edentulism and residual ridge resorption and use of different study methodology. In this study all the patients reported for CD treatment for the first time which could be a reason for the favorable denture supporting tissues (DSTs). In both studies same classification system was used.¹³

The frequency of unfavourable maxillary residual ridge morphology (25%) is consistent with a local study. A square to round shape ridge crest with parallel walls with no tori and exostoses is most favorable for treatment. Patients having Class I palate and throat forms are the most favorable to treat.

The frequency of unfavorable maxilla-mandible relation (34.6%) is not consistent with other studies. This may be because of differences in ages of two populations. Due to increased residual ridge resorption there is decrease in the inter-arch space resulting in the movement of the lower jaw anteriorly which gives it a prognathic appearance.

There is an increase in the number of difficult-to-treat patients with age though this relation was statistically insignificant. As age increases there is increased risk of systemic diseases as in old age dietary habits changes which results in deficiency of many necessary vitamins and nutritional demands. Inflammatory tissue changes in the mouth of edentulous patients have been hypothesized to have a direct detrimental effect on denture-supporting mucosal health and underlying basal structures. Furthermore, the success or failure of prosthodontics treatment in terms of patient comfort and function is directly linked to tissue health which renders these patients difficult for prosthodontics treatment.

Unfavorable mandibular bone height has statistically significant relationship with gender (p -value=0.030). This is because osteoporosis is one of the most important clinical conditions seen in the aging population due to the associated high incidence of residual ridge resorption (RRR). It has been found that severity of bone loss, in both osteoporosis and residual ridges, increases with the advance of age and favors the female sex for predisposition. Post-menopausal women comprise most of the female edentulous population with severe RRR. The effect of menopause on the mandible was thought to be similar to the effect on the rest of the skeleton and therefore places the post-menopausal women at a higher risk of becoming complete denture patients with severe RRR. Most of the females in the present study were past the usual age for menopause, and this may explain the gender-

related difference observed in this study. Previous studies have reported similar results.^{21,22} Furthermore, experimental work has shown that estrogen depletion leads to a significant loss of bone mass in the edentulous mandible but not in the dentate mandible.

Most patients had more than one landmark unfavorable. Aspects of the anatomy of the mandibular ridge (either bone height or muscle attachment) were the variables most commonly found, either alone or together. This result is consistent with the other studies.²³

Conclusions & Recommendations

- 1 Within the limitation of this study, it is concluded that:
- 2 Half of the patients in the present study were older than 60 years. Patients in this age group having unfavourable intraoral features were therefore considered difficult-to-treat because of these and the associated likely decreased adaptive capability.
- 3 Local needs and demands for CD is high in this part of the world because medical, psychological and financial constrains as well as limited availability of modern prosthodontics treatment options.
- 4 A great majority of patients presented with unfavorable intraoral features, rendering them as "Difficult-to-treat" patients. This presents a warning sign when edentulous patients will be treated by students or general dental practitioners (GDPs).
- 5 Most of the females were in the postmenopausal age, therefore, difficulty level of treatment of these patients would be high due to psychological problems and other complications associated with menopause.
- 6 Mandibular bone height was significantly reduced in females which showed relationship of bone resorption with menopause as most of the females were in the postmenopausal age.
- 7 High frequency of unfavorable features necessitates pre-prosthetic preparation of these patients and referral to and consultation with prosthodontist before treatment by GDPs and students.
- 8 Results of this study are based on limited patients reporting to this unit. The results perhaps would have been different if the study had been conducted at community level. So larger multi-center studies are required to give the exact picture.
- 9 Screening of patients for complexity is required so that referral to specialists can be done for use of specialized techniques to ensure success of CD.
- 10 CD treatment, to a great extent, depends for its success not only on the condition of the patients' mouth but also on his / her general health and attitude. Rehabilitation with CDs involves treating the patient and not just the oral cavity. Thorough assessment of biological environment, physiological and psychological conditions of each patient is necessary for success of therapy.
- 11 The determination of the success of a given prosthesis is established by many clinical, restorative material, and biomechanical considerations. Comprehensive treatment planning will aid in the execution of functionally efficient prostheses.

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