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To Evaluate Frequency of Denture-related Ulcerations and Postinsertion Adjustments in Complete Denture Patients: An In vivo Study

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ABSTRACT

Background: Removable complete denture is one of the most common treatment modalities for completely edentulous patients. After denture insertion, patient very often faces problems with the denture even after complete care is taken during fabrication procedure. Most common complaint is traumatic ulcers. The present study aimed to locate the most common areas of ulcerations due to complete dentures, how frequently they occur and how many times patient visits for adjustment after insertion of complete denture.

Materials and Methods: Two hundred and twenty-one patients were selected and were delivered complete dentures. Dentures were fabricated for all the patients. Each step of denture fabrication was controlled and guided by a prosthodontist. After placement of dentures, patients were evaluated at every recall visit and their dentures were adjusted. All the details of each visit (area of ulceration) and number of visits were recorded in a self-designed format. Descriptive statistical analysis was done using SPSS version 13 software. Chi-squared test was used to evaluate the correlation between mucosal injuries and postinsertion day and the relationship between lesions, patient age, and patient gender.

Results: All the 221 patients required denture adjustment due to mucosal injuries. No significant difference was found between denture-related injuries between males and females. Injuries related to mandibular dentures were significantly higher than those related to maxillary dentures. In mandible, the most common area of mucosal injury is posterior one-third of alveololingual sulcus; while in maxilla, the most common area of mucosal injury is labial frenum.

Conclusion: Postinsertion adjustments are an important aspect of rehabilitating patient with complete dentures. Most of the denture-related injuries were in limiting areas. Proper border molding techniques, accurate secondary impressions, and use of pressure indicating paste during denture insertion are main requisites for decreasing denture-related mucosal injuries.

Keywords: Complete denture, denture adjustment, denture related mucosal lesions, postinsertion checkups.

INTRODUCTION

Removable complete denture is one of the most common treatment modalities for completely edentulous patients. After denture insertion, patient very often faces problems with the denture even after complete care is taken during fabrication procedure. The most common patient's complaint is traumatic ulcers, caused by dentures. [1] Due to discomfort caused by these traumatic ulcers, patients are hesitant to wear dentures and they doubt the treatment capabilities and treatment plan of dentist. There are various factors which can cause these traumatic mucosal injuries. The most

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common factors are denture irregularities, overextended denture flanges, improper denture adaptation, improper occlusal contact, tissue undercuts, and denture porosities.[1,2] Most of these are related to either laboratory or clinical errors during various steps of denture fabrication. Dentist is not solely responsible for the success of denture therapy. Patient cooperation during the adjustment period is also quite essential for the success of complete denture treatment. Dentist should educate the patient not only regarding maintenance and care but also about the problems patients are likely to face during postinsertion adjustment period. Mikkonen et al. [3] studied the dentures according to age, sex, geographical region of living and discussed its importance with oral mucosal lesions occurring due to dentures. About 50% of denture wearers have lesions at some point of time; females were affected more than males. They also stated that the prevalence of lesions decreased with age. They also notified that the difference of occurrence of lesions varies according to the geographical region of living. Jainkittivong et al. [4] did a study to determine the prevalence of oral mucosal lesions and denture-related mucosal lesions in denture wearers and to correlate the prevalence with age, gender, type of denture, and any systemic condition. In their study, they found that approximately 20% denture-related lesions were due to trauma. Dervis[5] studied the problems faced by patients 3 months after the insertion of dentures and found that denture fabrication technique, patient tissue health, and patient's complaints are related to each other. Laurina and Soboleva[6] in their study found that the most important reason for patients coming with denture complaints is improper designing and technique of denture fabrication. Kivovics et al. [7] also emphasized on the fact that over extended denture flanges in the limiting areas irritate the tissues and cause injuries and ulcerations. As removable dentures are inserted in the oral cavity which is surrounded by fragile and mobile tissues, some problems are bound to occur in initial stages of denture insertion. However, by proper treatment planning, impression making, lab support, and patient education, if we can minimize patients discomfort and number of postinsertion visits, then the removable denture therapy can be a great success. By locating the most common areas where denture-related ulcerations occur, dentist can assess his denture fabrication technique which can help in minimizing same problems in future. This study aimed to determine the common locations and frequency of denture-related ulcerations and to determine how frequently patient visits to the dentist to achieve comfort.

MATERIALS AND METHODS

Two hundred and twenty-one patients (93male and 128 females) [Table 1] were selected and were delivered complete dentures in the Department of Prosthodontics, Modern Dental College, Indore. Medical and dental histories were reviewed and oral tissues were examined before selecting the patients. Patients were selected irrespective of whether they are new denture wearers or have previous denture history.

Inclusion criteria

- Patients requiring removable maxillary and mandibular complete dentures
- Systemically healthy patients.

Exclusion criteria

- Patients with history of diabetes, immunologic diseases, neurologic diseases, mental disorder
- History of allergy to acrylic resin
- Unhealed extraction sockets
- Candida infection
- Patients using any form of tobacco
- Patients above 75 years of age.

Using the methods and materials advocated by Zarb and Bolender,[1] complete dentures were fabricated (by interns) for all the patients. Each and every step of denture fabrication was controlled and guided by a prosthodontist. All the interns were trained by prosthodontist (before they participated in the study). After placement of dentures, all the patients were recalled on the 1st, 3rd, and 7 days after insertion and then after every 4–5 days until all the mucosal injuries subsided and patient comfort was achieved. All patients were prescribed a topical anesthetic gel (Dologel CT, Dr. Reddy's), for topical application on ulcers, for patients comfort. All the details of each visit (area of ulceration) and number of visits were recorded in a self-designed format. Descriptive statistical analysis was performed using) SPSS version 13, New York, USA. Chi-squared test was used to evaluate the

Table 1: Number of adjustments done and respective anatomical site in mandibular arch.

Anatomical Sites	Adjustment 1			Adjustment 2			Adjustment 3			Adjustment 4			Adjustment 5		
	Male patient	Female patient	Total	Male patient	Female patient	Total	Male patient	Female patient	Total	Male patient	Female patient	Total	Male patient	Female patient	Total
Mandibular labial frenum	11	17	28	6	16	22	5	15	20	3	14	17	2	6	8
Mandibular labila vestibule	14	12	26	9	9	18	6	6	12	3	7	10	2	4	6
Mandibular buccal frenum	4	4	8	3	1	4	3	0	3	3	1	4	1	2	3
Mandibular buccal vestibule	14	16	30	7	8	15	5	5	10	1	2	3	1	3	4
Retromolar pad	13	16	29	8	10	18	6	9	15	3	5	8	2	3	5
Pterygomandibular raphe	1	4	5	1	6	7	0	4	4	0	1	1	2	2	4
Retromylohyoid curtain Alvelolingual	1	4	5	1	1	2	2	2	4	0	1	1	1	0	1
Lingual sulcus (anterior 1/3)	8	19	27	6	8	14	6	7	13	4	4	8	4	5	9
Lingual sulcus (middle 1/3)	19	38	57	22	35	57	11	26	37	7	11	18	1	4	5
Lingual sulcus (posterior 1/3)	29	42	71	24	43	67	20	36	56	15	22	37	13	10	23
Lingual frenum	6	6	12	2	4	6	3	2	5	4	4	8	2	2	4
Mandibular crest of Ridge (anterior)	8	5	13	4	2	6	2	0	2	3	0	3	2	0	2
Mandibular crest of (ridge (posterior)	8	10	18	6	4	10	4	2	6	3	2	5	2	1	3
Mandibular slope of Ridge (anterior)	3	2	5	1	1	2	2	0	2	1	1	2	0	0	0
Mandibular slope of Ridge (posterior)	4	1	5	1	1	2	1	0	1	0	0	0	0	2	2
Mandibular tori	3	2	5	2	2	4	1	2	3	1	2	3	1	1	2
Buccal shelf area	9	10	19	7	9	16	8	8	16	5	5	10	4	3	7
Total															

Anatomical Sites	Adjustment 6			Adjustment 7			Adjustment 8			Adjustment 9			Total
	Male patient	Female patient	Total	Male patient	Female patient	Total	Male patient	Female patient	Total	Male patient	Female patient	Total	

Mandibular labial frenum	1	11	12	0	5	5	0	1	1	0	0	0	113
Mandibular labila vestibule	1	4	5	0	1	1	0	0	0	0	0	0	78
Mandibular buccal frenum	1	1	2	1	0	1	1	1	2	0	0	0	27
Mandibular buccal vestibule	1	1	2	1	1	2	1	0	1	0	0	0	67
Retromolar pad	3	1	4	0	1	1	0	0	0	0	0	0	80
Pterygomandibular raphe	3	0	3	0	0	0	0	0	0	0	0	0	24
Retromy lohyoid curtain Alvelolingual	0	0	0	0	0	0	0	0	0	0	0	0	13
Lingual sulcus (anterior 1/3)	1	3	4	1	2	2	1	1	2	1	0	1	80
Lingual sulcus (middle 1/3)	3	4	7	1	2	3	0	1	1	0	2	2	187
Lingual sulcus (posterior 1/3)	7	7	14	2	1	3	0	1	1	0	1	1	273
Lingual frenum	0	2	2	0	2	2	0	0	0	0	0	0	39
Mandibular crest of Ridge anterior)	2	0	2	0	0	0	0	0	0	0	0	0	28
Mandibular crest of (ridge (posterior)	1	1	2	0	0	0	0	0	0	0	1	1	45
Mandibular slope of Ridge (anterior)	1	0	1	0	0	0	0	0	0	0	0	0	12
Mandibular slope of Ridge (posterior)	1	0	0	0	0	0	0	0	0	0	0	0	10
Mandibular tori	1	0	1	1	0	1	1	0	1	1	0	1	21
Buccal shelf area	1	1	2	0	1	1	0	0	0	0	0	0	71
Total													1168

Table 2: Number of adjustments done and respective anatomical site in maxillary arch.

Anatomical Sites	Adjustment 1			Adjustment 2			Adjustment 3			Adjustment 4			Adjustment 5		
	Male patient	Female patient	Total	Male patient	Female patient	Total	Male patient	Female patient	Total	Male patient	Female patient	Total	Male patient	Female patient	Total
Maxillary labial frenum	23	41	64	20	31	51	17	32	49	12	18	30	7	7	14
Maxillary labial vestibule	18	27	45	15	24	39	11	15	26	8	8	16	6	8	14
Maxillary buccal frenum	8	6	14	1	6	7	2	4	6	2	3	5	2	2	4
Maxillary buccal vestibule	12	14	26	5	13	18	4	14	18	1	3	4	1	2	3
Maxillary tuberosite region	8	12	20	5	7	12	0	2	2	3	0	3	1	0	1
Hamular notch	6	7	13	2	2	4	1	4	5	1	6	7	0	4	4

PPSA	14	25	39	12	18	30	7	15	22	7	14	21	8	12	20
Mid platine raphe	3	10	13	1	6	7	2	4	6	2	3	5	0	1	1
Incisive papilla	3	2	5	2	2	4	0	2	2	0	0	0	3	1	4
Rugae	0	1	1	1	2	3	1	3	4	0	2	2	2	0	2
Maxillary crest of Ridge (anterior)	4	0	4	0	0	0	0	2	2	0	2	2	2	0	2
Maxillary crest of Ridge (posterior)	3	2	5	1	3	4	0	2	2	0	1	1	0	1	1
Maxillary slope of Ridge (anterior)	1	0	1	0	0	0	0	0	0	1	0	1	0	0	0
Maxillary slope of ridge (posterior)	2	1	3	1	2	3	1	0	1	0	0	0	0	1	1
Maxillary tori	3	2	5	2	1	3	0	1	1	0	0	0	0	1	1
Posterior lateral aspect of Hard palate	0	1	1	1	0	1	2	0	2	0	1	1	1	1	2
Total															

Anatomical Sites	**Adjustment 6**			**Adjustment 7**			**Adjustment 8**			**Adjustment 9**			**Total**
	Male patient	**Female patient**	**Total**	**Male patient**	**Female patient**	**Total**	**Male patient**	**Female patient**	**Total**	**Male patient**	**Female patient**	**Total**	
Maxillary labial frenum	6	9	15	0	3	3	0	2	2	0	0	0	228
Maxillary labial vestibule	4	5	9	0	1	1	0	1	1	0	1	1	132
Maxillary buccal frenum	2	0	2	2	0	2	0	0	0	0	0	0	40
Maxillary buccal vestibule	0	1	1	0	0	0	0	0	0	0	0	0	70
Maxillary tuberosite region	0	2	2	0	0	0	0	0	0	0	0	0	40
Hamular notch	0	4	4	0	0	0	0	0	0	0	0	0	37
PPSA	4	7	11	0	1	1	0	0	0	0	0	0	144
Mid platine	0	0	0	0	0	0	0	0	0	0	0	0	32

raphe													
Incisive papilla	1	1	2	0	0	0	0	0	0	0	0	0	17
Rugae	2	1	3	0	0	0	0	0	0	0	0	0	15
Maxillary crest of Ridge (anterior)	0	0	0	0	0	0	0	0	0	0	0	0	10
Maxillary crest of Ridge (posterior)	0	0	0	1	0	1	0	0		0	0	0	14
Maxillary slope of Ridge (anterior)	0	0	0	0	0	0	0	0	0	0	0	0	2
Maxillary slope of ridge (posterior)	0	0	0	1	0	1	0	0	0	0	0	0	9
Maxillary tori	0	1	1	0	0	0	0	0	0	0	0	0	11
Posterior lateral aspect of Hard palate	0	1	1	0	0	0	0	0	0	0	0	0	8
Total													809

correlation between mucosal injuries and postinsertion day and the relationship between lesions, patient age, and patient gender. Statistical significance was defined at $P < 0.05$.

RESULTS

After placement of dentures, all the patients were recalled on the 1st, 3rd, and 7th days after insertion and then after every 4–5 days until all the mucosal injuries subsided and patient comfort was achieved. The results showed that in all the postinsertion appointments, patients complained of ulcers due to mandibular dentures more frequently than maxillary. Hence, numbers of adjustment requirements were more in mandibular dentures. In maxillary arch, most frequently ulcerations were seen in (a) labial frenum (28.2%), (b) posterior palatal seal area (17.8%), (c) maxillary labial vestibule (16.3%), (d) maxillary buccal vestibule (8.7%) [Tables 2 and 3]. In mandibular arch, most frequently ulcerations were seen in (a) alveololingual sulcus posterior one-third (23.4%), (b) alveololingual sulcus middle one-third(16%), (c) mandibular labial frenum (9.7%), (d) retromolar pad, and (e) anterior one-third of alveololingual sulcus (6.8%) [Tables 2 and 3].

In mandibular arch, the least common locations for ulcerations were (a) mandibular slope of the ridge posteriorly (0.9%), (b) mandibular slope of the ridge anteriorly (1%), (c) retromylohyoid curtain (1.1%), (d) mandibular tori (1.8%) [Tables 2 and 3].

As seen in Table 4, 164 out of 221 maxillary dentures and 198 out of 221 mandibular dentures needed adjustments during the first visit, due to mucosal ulcerations caused by the denture. In the subsequent appointments, the number of mucosal injuries decreased. More adjustments visits were required for mandibular dentures as compared to maxillary dentures. The results of our study showed that the number of mandibular dentures requiring adjustments was significantly higher than maxillary dentures. Statistically significant difference was found between age and maxillary as well as mandibular adjustment ($P = 0.000$). There was no significant difference between males and females in terms of mucosal ulcerations of the maxilla and mandible ($P = 0.711$ and 0.547 for mandibular and maxillary arch, respectively).

DISCUSSION

In the present study, approximately 74% of patients required adjustment in maxillary denture in first 24 h after denture insertion. Adjustment percentage decreased to 62%, 49%, 36%, 28%, and 19% in the 2nd, 3rd, 4th, 5th, and 6th visits, respectively. In mandibular denture, 90% of patients required adjustment in the first visit, followed by 83%, 67%, 45%, 33%, and 22% in the 2nd, 3rd, 4th, 5th, and 6th visits, respectively. This signifies the fact that complete denture treatment is not adequate at and complete till the patients are cared for proper postinsertion checkups. This postinsertion period is most critical to assess the success and failure of denture service. Studies done by Kivovics et al. [7] also had similar adjustment requirements in their postinsertion appointments. Our study emphasizes the importance of postdenture insertion visits adjustments and patient education.

In the present study, maximum numbers of mandibular ulcerations were found in alveololingual sulcus region; this can be due to

(1) denture flanges that are overextended in an attempt to increase retention,

(2) dependence of recording depth of lingual sulcus on patient's ability to perform proper tongue movement.

In the maxillary arc, maximum numbers of ulcerations were found in labial frenum area. This can be due to improper deepening and widening of the labial notch of maxillary denture at the time of denture insertion. In our study, posterior palatal seal area displayed second highest ulcerations (for maxillary arch); this can be attributed to over postdamming to gain retention. A study done by Kivovics et al. [7] showed a higher frequency of ulcerations among males as compared to females. In the present study, there was no significant difference between males and females in terms of mucosal ulcerations of the maxilla and mandible. Statistically significant difference was found between age and maxillary as well as mandibular adjustment. As most of the denture-related ulcerations were seen in limiting structures of maxilla and mandible, proper border extensions are mandatory for a successful denture. Hence, a good border molding along with proper impression

technique should be performed. No overzealous attempts should be made to increase the denture bearing area to increase retention as these lead to denture-related ulcerations. Furthermore, acrylic resin has the property of absorbing water for first few weeks, due to which some changes do occur in size and shape of dentures. These changes are very minute but can lead to some occlusal changes which can cause discomfort to the patient as dentures can shift or slide in function.[1] Before making any adjustment, a thick layer of pressure indicating paste should be applied on the concerned area, and required movements should be performed to determine if the problem is over extension or contact pressure.

Results of this study show that maximum number denture-related ulcerations are seen in limiting areas of maxillary and mandibular arches. Proper technique of border molding and use of appropriate impression materials can significantly decrease number of denture-related ulcerations in these areas. This can decrease number of patient recall visits and can save valuable chairside time, spent in the adjustment of these dentures.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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