

Effectiveness of hard liner in poorly fitting lower complete denture

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Abstract

Edentulism is a handicap that affects the quality of life and nutrition. Despite advances in preventive dentistry, edentulism is still a major public health problem worldwide. More than one third of edentulous patients are not fully satisfied with their complete dentures and mainly complained of insufficient retention, masticatory efficiency and pain during mastication because of their ill-fitting dentures. This can be due to alveolar ridge resorption, wear and damage to the denture base, particularly with their mandibular dentures. The purpose of this study is to observe the effectiveness of hard lined old dentures compared with new lower dentures in retention, masticatory efficiency and patient satisfaction. Retention of all study dentures was measured by a force gauge, the masticatory efficiency was evaluated by using of color changeable chewing gum and the patient satisfaction was assessed by modified Smith's method. There were no significant differences between the retentive force and masticatory efficiency of hard lined old dentures and new lower dentures ($p>0.05$) in both time points. Regarding patient satisfaction, there was significant difference at the day after delivery ($p<0.05$) where majority of hard lined old denture scored with high satisfaction but there was no significant difference after adaptation period (two weeks after delivery) ($p>0.05$). It can

be concluded that improvements in retention, masticatory efficiency, patient satisfaction of hard lined old lower dentures can be comparable to those of new lower dentures and given immediate patient satisfaction.

Introduction

Classical treatment for edentulous patient is fabrication of complete denture to restore oral function, comfort, appearance and health of the edentulous patient for more than a hundred year [1]. Conventional complete denture is still represented the most common therapy for edentulous individuals [2]. The more the time of denture wearing age, the greater the adaption to the denture and dentures become as part of their body, which is more especially in elderly. Unfortunately, the underlying structures that support the dentures are not constant. Alveolar resorption is a continuous process though varying in degree and dentures are functional appliances that are continuously in use. The comfort, efficiency, stability, retention and appearance of dentures are all liable to become impaired with the long passage of time. Face, jaw and tissues change over the time passed, but denture, prosthesis does not. They cannot adapt to the physical changes and patient may become less satisfy their existing dentures. Greater rate of alveolar bone resorption on the mandible than the maxilla further intensifies the

problem [3, 4].

Due to the continuous alveolar bone resorption, fitting of complete denture may spoil and lead to poor retention. Lack of retention of prosthesis may lead to poor masticatory efficiency and reduce patient satisfaction. In addition to poor oral functions with unstable dentures, there is also the potential of being traumatic to the supporting tissues. Movements of the denture base in any direction on their basal seat can cause tissue damage. In long term complete denture wearers, the morphologic changes and the reduction of the residual ridge present serious problems to the clinician on how to provide adequate support, stability and retention of new dentures [1]. The commonest complaints of patient who wear complete dentures are that the dentures are loose and that they cause pain [5]. Poor fitting dentures may spoil the health of the underlying mucosa and some of the dentists suggest their complete denture wearing patients the dentures should be replaced with new one every five years and some say three years. Judgment of a need for replacing with new dentures has been a reflection of the knowledge, experience and skill of each individual dentist. However, making a new prosthesis is time consuming, costly and the patient would try to get adaptation to new prosthesis again and again. Edentulous patients are mostly elderly. In treatment of the elderly, dentist should consider the facts prompt, quick and effective. One of the objectives in Geriatric dentistry is "Happiness is the great therapy". The old denture is poor fitting but patient is familiar with it. Under the condition, dentist should provide the improvements of their existing old denture rather than renewing. But other factors of the denture must be acceptable such as aesthetics and denture occlusion [6].

Although in case of treatment making new denture is compulsory, there are intermediary process that can be applied in before new denture stage and that would be a less costly and time saving event such as relining old dentures. The patient can get well functioning dentures only in a single visit by applying denture liner on their poor fitting old dentures. Even though renewing must be done, hard lined old denture will provide better status to the patient during the steps of new denture treatment.

Relining is defined as "the procedures used to resurface the tissue side of a denture with new base material, thus producing an accurate adaption to the denture foundation area" [7]. The reline procedure is most often used when factors other than loss of bone or soft-tissue support has changed for the patient (i.e., the vertical dimension, occlusion, phonetics and functionality of the dentures are acceptable), and these changes are compensated for by the addition of new acrylic resin to the intaglio surface of the denture [8].

Denture lining materials are of several types and are used for a variety of reasons, mainly hard and soft. The materials which satisfy the various requirements can be classified into three groups. There are hard reline materials, tissue conditioners and soft lining materials [9]. There are two main methods of relining dentures: the direct (chairside) method and the indirect or processed method. There are times and cost savings with the chairside method. The purpose of this study is to compare the effectiveness of hard lined lower complete dentures with new lower dentures in retention, masticatory efficiency and patient satisfaction.

Materials and Methods

12 lower complete denture wearing patients were selected. Inclusion criteria are patients wearing poorly fitting lower complete dentures but denture occlusion must be acceptable. Patients with unfavorable atrophic alveolar ridge were excluded in this study. Study materials and measuring devices used in the study are 1. Hard Denture Liner Material (Tokuyama Rebase II, Tokyo, Japan), 2. Handy Analog Push-Pull Gauge, NK-20 (ANGOL Instrument Co. Ltd. Taiwan) and 3. Masticatory efficiency Evaluation Gum (XYLITOL Lotte Co.Ltd., Japan).

Study Procedure

At the first visit of the patient, hard lining material was applied on the fitting surface of poorly fitting lower old denture and primary impression making was done for new denture fabrication. Next day, second visit of the patient, secondary impression was made and retention, masticatory efficiency and patient satisfaction of hard lined old lower denture were observed. For retention measurement, the patient was seated upright in the dental chair and the mandibular denture was positioned on the ridge and the patient was asked to rest the tongue passively in the floor of the mouth with the tip adjacent to the anterior denture teeth. A small wire hook was already attached at the mid-labial flange of lower denture with self-cured acrylic resin. The force gauge connected to the mandibular denture was pulled vertically until the denture dislodgement occurs. This force was measured three times with five minutes interval and the mean measurement was calculated and recorded. This force was measured in grams and recorded as the denture retention.

For evaluation of masticatory efficiency, patients were instructed to chew the color changeable chewing gum for 3 minutes. The chewed gums were collected immediately after chewing and placed on plain paper. The colors of chewed gums were assessed using the color guide (the five color chart on package). The colors of chewed gums were assessed by two examiners. The result was converted to a numerical value determined by measuring in millimeters from the left-hand end of the 100mm long VAS line to the marking and the measured value was defined as the masticatory efficiency score. The patient satisfaction level was evaluated by means of questionnaire as Modified Smith's method [10].

After observation of hard lined old lower denture, the new lower complete denture was fabricated according to standardized methods used in the department. Two weeks after hard lining visit, retention, masticatory efficiency and patient satisfaction on hard lined old lower complete denture was examined again and delivered new complete denture. Then follow-up recall was next day visit and three parameters was measured in the same manner. Patient was requested to use new lower denture for two weeks and not to use old and new alternately. Two weeks after delivery of new denture, three parameters were measured again and research procedures were completed. Long term use of modified, hard lined old denture or new denture is the independent choice of the patients.



Figure 1. Hard Denture Liner Material (Tokuyama Rebase II, Tokyo, Japan)



Figure 2. Handy Analog Push-Pull Gauge, NK-20 (ANGOL Instru. Co. Ltd. Taiwan)



Figure 3. Masticatory efficiency Evaluation Gum (XYLITOL Lotte Co.Ltd., Japan)

a



b

Figure 4. Hard lined and New lower complete dentures (a) Occlusal surface (b) Impression surface

Results

According to the clinical assessment of denture retention by using push-pull gauge, all dentures gave scores showing good retention in both one day and two weeks after delivery. Highest retention (659.38 gf) was noted in new denture cases after two week adaptation period.

Table 2 demonstrated that masticatory efficiency of HLLCD is comparable with that of NLCD. The highest masticatory efficiency (77.5 gf) was granted by one day after delivery of HLLCD. It was found that masticatory efficiency of new denture did not reach the level of hard lined old denture at one day after delivery. Efficiency was not improved after two weeks in HLLCD group while increased in NLCD group.

Table 3 shows the levels of patient satisfaction on HLLCD and NLCD groups at one day and two weeks after delivery. Though both groups provide good satisfaction levels, most of the patients (10 out of 12, 83.3%) were very satisfied with their hard lined old dentures.

Discussion

In this study, among the 12 subjects of study population, 6 (50%) were male and 6 (50%) were female with the mean age of (75) years old and minimum and maximum ages were 60 and 88 respectively. The total denture experience of this study group ranged from 3 years to 20 years and the age of the present dentures varies from

3 years to 7 years.

On studying the retention of study dentures, mean retention scores of HLLCD at one day and two week after delivery were 526.88 gf and 593.58 gf while 587.45 gf and 659.38 gf for NLCD respectively. Highest retention score was recorded in new denture after two week adaptation period. The results of this study support the previous study [11], it stated that relining might improve retention and stability of poor fitting old dentures. The retention forces gradually increased after adaptation in both HLLCD and NLCD groups. The functional adaptation to new fixed and removable prostheses might require at least 1 month or more [12]. Highest retention score was achieved in two weeks after delivery of new dentures though statistically not significant. There is no statistically significant difference between retention scores of hard lined dentures and new dentures not only at the time of delivery but also after two weeks adaptation. According to these research findings, hard lining old denture improves retention and adaptation to new prosthesis needs some times.

On studying the masticatory efficiency of study dentures, it was found that masticatory efficiency of hard lined dentures is comparable with that of new dentures. There was no or only slight improvement of masticatory ability was obtained after the patients had received new dentures [13]. No significant differences when patients changed from old to new dentures at delivery time or during the adaptation period [11, 14]. The alterations made to improve the occlusal relationship and fit of the denture bases of poorly fitting dentures did not improve the chewing ability of denture wearers [11]. However, one study argued that although functional adaptation period

was required, the masticatory performance increased significantly when the patients were provided with new dentures [12]. It was noted that overall masticatory function did not reach the level of the old dentures. The results of this study agreed with previous studies [11, 13, and 14] and found no statistically significant difference between masticatory efficiency of hard lined old dentures and new dentures. This study found that slightly decreased masticatory efficiency two weeks after adaptation in HLLCD group while gradually increased in NLCD group though statistically no significant.

Concerning with patient satisfaction, questionnaires were used to assess retention, chewing satisfaction, comfort and general satisfaction with different dentures. It was found that relining old denture provided better satisfaction scores than new dentures. A moderately positive correlation was found between satisfaction of the patient and the quality of the dentures [15]. Several studies have shown that there was poor correlation between a dentist's assessment of denture quality and a patient's satisfaction [11, 16]. Patients were comfortable with hard lined denture when denture seating in its place and chewing foods. Two patients (16.7%) were satisfied and the rest majority (83.3%) was very satisfied with their hard lined dentures. It was found that only four patients (33.3%) were very satisfied and eight patients (66.7%) were satisfied with their new dentures. The level of satisfaction remains unchanged after two weeks adaptation period in HLLCD groups but dramatically increased (very satisfied up to 66.7%) in NLCD groups.

Denture fitting is so crucial to comfortable use that a slight misalignment can create many far-reaching problems in the mouth. Due to the nature of foundation tissues, denture

need adjustments from time to time to proper fit. Two types of relining are available; hard liner and soft liner. Both types of liners can either be performed in office or by using a do-it-yourself denture reline kit. Hard denture liners tend to be the standard and cost less than soft liner. The hard liners are more resistant to deterioration in comparison to soft denture liners. Regular dental checkups are crucial, but patient may not have to replace hard denture liners annually. By the experience of this study, chairside hard liner materials are useful for reline, repairs and border extension. These materials should accurately adapt to the denture-bearing surface, be highly polishable, demonstrate low heat generation during intraoral curing and have mechanical strengths.

Conclusion

Within the limitations of the study, it can be concluded that the direct chairside hard lining method is quick and convenient method for poorly fitting lower complete dentures and these hard relined dentures were much effective to ensure retention, masticatory efficiency, and patient satisfaction comparable to new dentures. According to these finding, the use of hard liner to poorly fitting lower complete denture is recommended as an interim treatment remedy before fabrication of new one.

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Time	HLLCD (gf) (n=12)			NLCD (gf) (n=12)		
	Mean (SD)	Mini.	Maxi.	Mean (SD)	Mini.	Maxi.
One day	526.88 (432.32)	183.3	1653.3	587.45 (487.87)	196.6	1953.0
Two weeks	593.58 (444.81)	206.6	1746.6	659.38 (559.95)	253.3	2240.0

Table 1. Mean retention of hard lined lower complete dentures (HLLCD) and new lower complete dentures (NLCD) at one day and two weeks after delivery

Time	HLLCD (n=12)			NLCD (n=12)		
	Mean (SD)	Minimum (score %)	Maximum (score %)	Mean (SD)	Minimum (score %)	Maximum (score %)
One day	77.50 (11.38)	60.0	90.0	73.33 (13.03)	50.0	90.0
Two weeks	76.67 (12.31)	60.0	90.0	76.67 (13.71)	50.0	90.0

Table 2. Mean masticatory efficiency of hard lined lower complete dentures (HLLCD) and new lower complete dentures (NLCD) at one day and two weeks after delivery

Time	HLLCD (n=12)		NLCD (n=12)	
	Very satisfied n (%)	Satisfied n (%)	Very satisfied n (%)	Satisfied n (%)
One day	10 (83.3)	2 (16.7)	4 (33.3)	8 (66.7)
Two weeks	10 (83.3)	2 (16.7)	8 (66.7)	4 (33.3)

Table 3. Distribution of the study lower complete dentures according to Patient Satisfaction scores

Denture	Retention (gf) Mean (SD)		Masticatory efficiency Mean(SD)		Patient satisfaction	
	One Day	Two Weeks	One Day	Two Weeks	One Day	Two Weeks
HLLCD	526.88	593.58	77.50	76.67	VS (10) S (2)	VS (10) S (2)
NLCD	587.45	659.38	73.33	76.67	VS (4) S (8)	VS (8) S (4)

Table 4. The summary of the study results (VS- Very Satisfied, S- Satisfied)

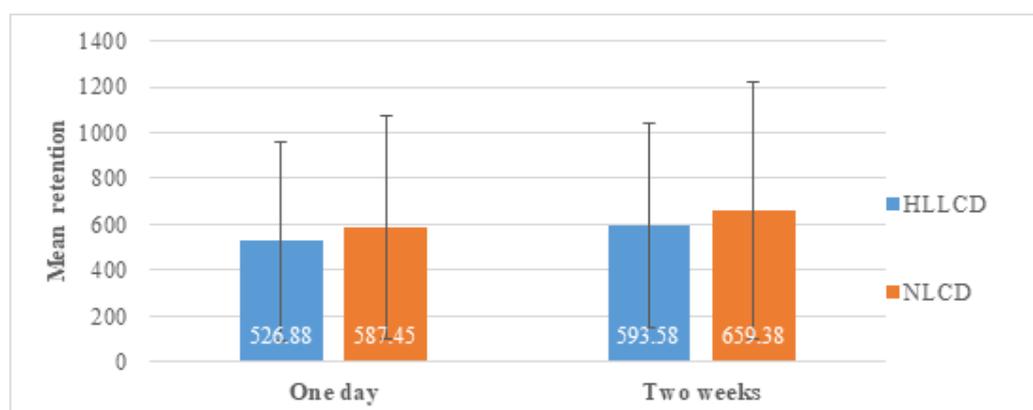


Figure 5. Retention score comparison of HLLCD and NLCD

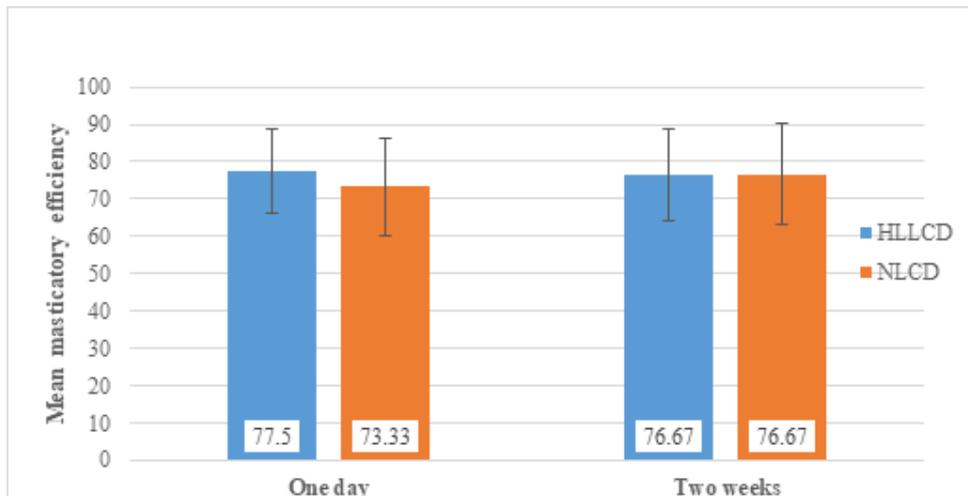


Figure 6. Mean masticatory efficiency comparison of HLLCD and NLCD

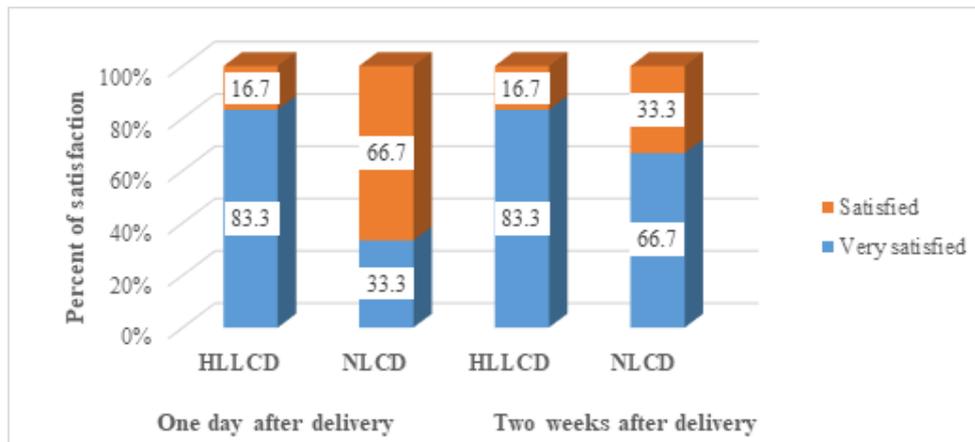


Figure 7. Patient satisfaction scores comparison of HLLCD and NLCD at one day and two weeks after delivery