

# Effect of Impression Technique on Denture Retention and Patient Satisfaction: A Comparative Clinical Study

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## ABSTRACT

**Objectives:** To compare satisfaction levels of patients wearing maxillary complete denture fabricated by closed mouth and an open mouth impression techniques.

**Methods:** This Comparative clinical study was conducted at the Department of Prosthodontics, Armed Forces Institute of Dentistry (AFID), Rawalpindi. Eighty-four edentulous patients were included in this study; the patients were randomly allocated into two groups. Group A patients were provided with dentures fabricated by closed mouth impression technique and Group B patients were provided with dentures fabricated by open mouth impression technique. The patient's satisfaction level was assessed after six weeks of denture insertion with a questionnaire attached as Annex-A.

**Results:** Out of 42 patients in group A, 12 were highly satisfied, 28 moderately satisfied and 2 poorly satisfied. In group B patients, 9 were highly satisfied, 25 moderately satisfied and 8 poorly satisfied. Retention was highest (81.0%) in patients of group A compared to group B (19%). Moderately satisfied patients were more significantly ( $p=0.04$ ) more (69.0% in group A and 71.4% in group B) comfortable compared to highly satisfied (26.2% in group A and 19.0% in group B) and poorly satisfied (4.8% in group A and 19.5% in group B) in both groups. There was no statistically significant difference among patients in both groups when their satisfaction with their ability to chew with dentures was compared. Regarding satisfaction with speech ability more patients were moderately satisfied (28.6% in group A) compared to the number of patients (21.4%) in group B. Overall, 70.2% of moderately satisfied category showed significantly higher frequency of patients followed by 17.9% patients each lying in highly satisfied and poorly satisfied patients' categories.

**Clinical implication:** Final impression in complete denture (CD) fabrication is very crucial step that can affect overall prognosis of CD treatment and therefore, patient satisfaction with CDs. A simplified closed mouth impression approach to complete denture treatment, omitting the border molding and definitive impression appointment, has been suggested as an alternative to the conventional open mouth approach.

**Conclusion:** Dentures fabricated by closed mouth impression technique are more stable and functionally better compared to those constructed by open mouth impression technique.

**Keywords:** Final impression technique, complete dentures, Retention, Comfort, Speech ability, Patient Satisfaction

## INTRODUCTION

Although dental implants has revolutionized the practice of prosthetic dentistry, the conventional complete denture remains the most popular treatment of choice for edentulism<sup>1</sup>. Edentulous people, that use complete dentures, adapt themselves by learning the oral motor skills required to ensure the optimal functioning of the prostheses during regular functional movements brought about by speech and mastication<sup>2</sup>. A successfully functioning maxillary and mandibular denture relies on the amalgamation of the patients' general oral functions and the psychological acceptance of their denture. These are dependent largely on the patients' denture stability during mastication and routine oral functions in combination with the patient's acceptability of the facial appearance. Some edentulous people report functional problems with their complete maxillary dentures. A number of factors could be responsible for such functional problems related to mastication and speech.<sup>3,4</sup>

A good quality complete denture requires optimal accuracy and efficiency in all steps of fabrication. Faulty dentures can enhance the process of resorption.<sup>3</sup>The first step on which precision depends is an accurate impression of the appropriate anatomic landmarks and denture-bearing area.<sup>5</sup>

Several factors can influence the quality of impressions, including the impression technique, the impression material and the bulk of material.<sup>6,7</sup> Some studies have indicated that the dimensional accuracy of the impression material is influenced by

the technique used.<sup>8</sup> Inaccuracies during impression making are generally transferred during the fabrication of the prosthesis; an inaccurate impression may cause laboratory errors and produce prosthesis misfit.<sup>9</sup>

The satisfaction of patient with the denture is of paramount importance since the patient-denture relationship is a long term and will only be sustainable if the patient has minimal or ideally, no complaints with the denture. A number of factors contribute to the user's satisfaction with prosthesis, including the ease with which they chew or speak appearance of the prosthesis and pain or discomfort. Oral tissues may not accept the new complete denture immediately and may require some time to accommodate it.<sup>10</sup>

Studies have been conducted to assess the patient satisfaction with dentures fabricated using different impression technique. Sharif has reported 26.6% and 10% satisfaction of patients with mandibular complete dentures fabricated by closed and open mouth technique respectively.<sup>11</sup> Results of another study showed that an alternative method for final impression is less time-consuming and has similar clinical outcomes when compared to the traditional final impression method.<sup>12,13</sup>

A simplified closed mouth impression approach to complete denture treatment, omitting the border molding and definitive impression appointment, has been suggested as an alternative to the conventional approach. However, studies showing comparison and clinical evidence are few. There is very limited evidence on which to base selection of the final-impression technique for fabrication of complete dentures and removable partial dentures.

The purpose of this study was to investigate the level of patient's satisfaction with dentures fabricated by open and closed mouth impression techniques in a larger number of edentulous patients.

## MATERIAL AND METHODS

The study was conducted at the Department of Prosthodontics at Armed Forces Institute of Dentistry (AFID) Rawalpindi, Pakistan for a period of eight months. A total of 84 patients were enrolled, 42 in each group. Patients were included if they presented with complete edentulism, in the age from 40 till 80 years. Patients with very atrophic ridges or ridges with bony exostosis and patient who were unavailable for follow up were excluded.

The patient's primary impressions were recorded in alginate impression material (CA37 manufactured by Cavex Inc., Holland). Stone casts were made. Individual (custom) trays were fabricated in self-cured acrylic resin (Self Polymerizing Powder, manufactured by Deven International, UK). Following that, secondary impressions were recorded in the custom trays using elastomeric impression material. The patients allocated to Group A, were provided maxillary complete dentures fabricated by closed mouth impression technique. For the patients in Group A, both upper and lower jaw record bases with a flat-wax occlusal rim at a selected vertical dimension were placed in patient's mouth and while recording final impression the patients were instructed to close their jaw, suck, swallow and move their lips.

The patients allocated to Group B, (control group), were given maxillary dentures fabricated by open mouth impression technique, in which custom tray was placed in the patient's mouth and the operator himself manipulated the musculature involved in oral functions. After bite registration and teeth trial, the patients were provided with dentures and asked to report if there is any post insertion complaint.

The patients were called on follow-up once a week and denture adjustment was done if needed. After insertion of the dentures, all patients were scheduled for follow up visits after six weeks' interval and their satisfaction level was measured with the help of a validated questionnaire. They were asked four major questions regarding comfort, dislodgement of dentures (stability), ability to chew (mastication) and speech. Patient responded on a likert scale of 1-3, where 3 was highly satisfied and 1 was highly unsatisfied. A maximum of 12 and minimum of 4 marks could be attained by the patients. Their satisfaction level was graded as highly satisfied (score of 10 to 12), moderately satisfied (score of 07 to 09) and poorly satisfied (score of 04 to 06). No patients dropped out or were lost at any point in the study.

The Data was entered and analyzed using the IBM SPSS (Statistical Package for the Social Sciences) version 19.0. The effects of open and close mouth denture satisfaction were evaluated with t-test. An arbitrary value of  $p < 0.05$  was considered statistically significant.

## RESULTS

It was noted that the comfort level of the patients in category moderately satisfied was significantly ( $p = 0.04$ ) highest (69.0% in group A and 71.4% in group B) compared to patients comfort level in highly satisfied (26.2% in group A and 19.0% in group B) and poorly satisfied (4.8% in group A and 19.5% in group B) in both groups (Table 1).

Overall comparison of satisfaction level showed significantly ( $p=0.4$ ) higher frequency (70.2%) of patients in moderately satisfied category ensued by 17.9% patients each lying in highly satisfied and poorly satisfied patients' categories.

Table 1: Comparison between the patients of Group A and Group B in terms of Frequency of comfort levels

Variable	Group A	Group B	P value
Highly satisfied	12 (26.2%)	9 (19.0%)	0.04
Moderately satisfied	28 (69.0%)	25 (71.4%)	
Unsatisfactory	2 (19.5%)	8 (19.5%)	

It was noted that retention related satisfaction was highest (81.0%) in patients of group A compared to corresponding group B with 19% only (Table 2). More patients of group B responded as moderately satisfied with retention of their dentures. There was a significant difference in denture retention related satisfaction in patients of group A and B. 7.1% of group B reported poor satisfaction to denture retention compared to none reported in group A.

Table 2: Comparison of satisfaction with denture retention (N=84)

Variable	Group A	Group B	P value
Highly satisfied	34 (81.0%)	8 (19.0%)	0.01
Moderately satisfied	8 (19.0%)	31 (73.8%)	
Unsatisfactory	0 (0.0%)	3 (7.1%)	

There was a no statistically significant difference among patients in both groups when their satisfaction with their ability to chew with dentures was compared. More patients reported high satisfaction with their dentures in group B (26.2%) compared to group A (14.3%). More patients in group A reported moderate satisfaction with their ability to chew with their dentures (81 %).

Table 3: Comparison of satisfaction with ability to chew with dentures. N=84

Variable	Group A	Group B	P value
Highly satisfied	6 (14.3%)	11 (26.2%)	0.12
Moderately satisfied	34 (81.0%)	25 (59.5%)	
Unsatisfactory	2 (4.8%)	6 (14.3%)	

There were significant differences among patients in both groups when satisfaction with speech ability was compared. Maximum number of patients lied in Category moderately satisfied in both groups (Table 4). The patients belonging to the two groups were significantly different in their frequency. Moderately satisfied people had frequency of 85.7 % in group A and 78.6% in group B.

Table 4: Comparison of speech quality. N=84

Variable	Group A	Group B	P value
Highly satisfied	6 (14.3%)	3 (7.1%)	0.03
Moderately satisfied	36 (85.7%)	33 (78.6%)	
Unsatisfactory	0(0%)	6 (14.3%)	

When cumulative scores were compared between both group no statistically significant difference was seen. More people were moderately satisfied in group A compared to the number of patients in group B. It was noted that highly satisfied people had frequency of 28.6% in group A and 21.4% in group B (Table 5).

Table 5: Frequency Distribution of Patients' Satisfaction Levels

Variable	Group A	Group B
Highly satisfied	12 (28.6%)	9 (21.4%)
Moderately satisfied	28 (66.7%)	25 (59.5%)
Unsatisfactory	2 (4.8%)	8 (19.0%)

## DISCUSSION

It is well known that tooth loss has many negative and irreversible outcomes irrespective of the anatomical changes and position of the rest of teeth, it ends up in changes in alveolar ridge resorption of the lower and upper jaw and variations in soft tissues, with reduction of the adjacent gingival surface along with increased displaceable mucous surface. This results in speech disorders and changes in appearance with psychosocial decompensation. Such patients are generally treated using overdentures or complete dentures replacements. With the help of adhesive effect of saliva, dentures must fit and adjust accurately to the mucosal surface facial muscles and surrounding masticatory for stability. Complete recovery of patients' is possible by accurate and regular performing of laboratory and clinical treatments, including taking of

functional impression that ensure the shape and size of the denture bearing area, forms functional margins and registers mucosal resiliency of a would be denture with uniform transfer of masticatory pressure during functioning.<sup>14, 15</sup>

The current study was based on a questionnaire to identify the perception of Pakistani patients about satisfaction with the open and closed impression technique with complete denture in a selected group of the Pakistani population in Northern Pakistan. The literature reports number of studies using questionnaires based on evaluation of both type of denture. The result of this study are in agreement with previous literature, where most of the researchers have mixed results about satisfaction by the patients about open and closed impression techniques in the formation of dentures. It must be known that the satisfaction of patient is generally based on emotional and psychological factors that are of significance especially in patients with maladaptation even after having a technical advice. These patients are satisfied only if they are listened and communicated and show significant effects if the relationship between dentist and patient is strong.<sup>16, 17</sup> Dissatisfied patients generally are less bright and less stable, self-centered and meticulous compared to satisfied group of patients as reported by Al Quran et al.<sup>18</sup> The first mentioned type patients constitute aged people, who develop less sensitivity to taste with small magnitude of change and treated with number of drugs.<sup>19</sup>

It is assumed that variations in dislodgement satisfaction could be due to oral motor abilities and the capability of adaptation to new dentures that are not clearly age related. Moreover, biologic process could lead to considerable individual variations in oral motor and adaptation abilities. This study finds no relationship between patient gender and age on denture acceptance in agreement with Muller and Hasse-Sander<sup>20</sup> and Jonkman et al.<sup>21</sup>

The statistical results of this study showed that most of the patients were moderately satisfied in both groups; about comfort level, ability to chew food, quality of speech and general satisfaction level. However, there existed the highest (81%) satisfaction for dislodgement in Group A with. Overall patient satisfaction level was higher in Group A than in Group B.

The hypothesis of the study was that patient's satisfaction level would be higher with complete dentures fabricated by closed mouth impression technique as compared to those fabricated by open mouth impression technique. The patients who had been provided with dentures fabricated with closed mouth impression technique were more comfortable with their dentures, in comparison to patients who underwent the open mouth impression technique for the fabrication of their dentures.

It is important that the dentist be aware of the characteristics and limitations of the technique and material used to obtain an accurate recording of the denture bearing mucosa.<sup>12</sup> The closed mouth impression technique uses manual traction of soft tissues while permitting muscular movements by the patient that contribute to settle the final border design, delineating the location of individual muscle insertions. In fact, the characteristics of muscular insertion can easily be reproduced because the muscular records are obtained from the patient's natural oral movements rather than by the dentist's handling. In open mouth impression technique manual border molding is guided by extrinsic forces that may hide traces or not reproduce some functional movements when excessive manual force is applied, which will over-shorten the flange height. In this study, closed mouth impression technique yielded satisfactory results for the patients.

The overall results of this study are in agreement with the studies of Siirilä HS and Näkki K<sup>22</sup> and Nukazawa S.<sup>23</sup> These studies also suggested that the dentures fabricated with closed mouth impression technique are more comfortable and functionally stable than open mouth impression technique dentures. This could be because border tissues are recorded directly from the patient's functional movements (lips, tongue and cheeks), resulting in an accurate individualized impression process and producing excellent peripheral sealing; resulting in functionally more stable dentures.

The majority of edentulous patients opt for complete dentures for rehabilitating their oral cavity function and esthetics.<sup>24</sup> Restoration of mastication is very important aspect while rehabilitating the patient with complete dentures. Näkki K and Siirilä HS<sup>22</sup> reported that masticatory efficiency was better with open mouth impression technique dentures. Patients in their study reported to be more satisfied with their ability to chew dentures prepared using open mouth impression technique, in comparison to closed mouth impression technique. This may be due to the arrangement of teeth over the crest of the ridge which favors mechanical principles regarding mastication that buccal cusps and fossae of posterior teeth should be directly over the crest of the ridge.

Speech considerations are of paramount importance while fabricating complete dentures. During speech, tongue plays a key role. Rilandi and Sharry<sup>25</sup> pointed out that the size of the tongue does not decrease like generalized atrophy of all other tissues in aged people. It has been reported that there is about a 10 % increase in the size of tongue in edentulous patients, if not provided with complete dentures.<sup>26</sup> Goyal and Greenstein<sup>27</sup> functionally molded the palatal contours of the maxillary dentures and compared speech performance with conventional dentures. Their study results showed that speech was markedly improved with functionally contoured dentures Näkki K and Siirilä HS<sup>22</sup> also showed that speech was much better with dentures fabricated with closed mouth impression technique and most of the patients opted for dentures fabricated by closed mouth impression technique because of ease and clarity of speech. In closed mouth impression technique the position and movements of tongue is given due importance and position of tongue is recorded during whistling, swallowing, sucking and other functional movements. In this study, patients in Group A were more satisfied regarding clarity of speech. They felt ease and comfort while speaking as compared to Group B patients.

In this study, the final impression was recorded with silicon impression material which is considered a good material because of its rapid reproducibility and ease of manipulation but the material is expensive in comparison to conventionally used material i.e. low fusing compound which requires extra labor and time during clinical and laboratory practice.

Based on the results of this study, it is recommended that the closed mouth impression technique should be used for the fabrication of prosthesis in the rehabilitation of patients with edentulous mouths. With the use of modern materials, the scope and expediency of closed mouth impression technique can bring forward favorable results in terms of patient's satisfaction with different types of prosthesis.

## CONCLUSION

Dentures fabricated by closed mouth impression technique (simplified method) are more stable and functionally better compared to the Open mouth (Conventional) impression technique.

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**Conflict of Interest:** None

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