Original Article

One-year follow-up study to evaluate the marginal bone resorption and attachment loss with customized post with stud attachment and prefabricated access post for mandibular overdenture

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Abstract

Aim: This study aims to analyze the marginal bone resorption and attachment loss of the overdenture attachment for the mandibular overdenture.

Settings and Design: Observational study done at MGV's KBH Dental College and Hospital, Nashik, Maharashtra, India.

Materials and Methods: A total of 30 subjects were selected of either sex between the age group of 50-70 years by designate of randomized parallel controlled sampling technique. The Cone beam computed tomography (CBCT) radiographic quantification determines the caliber of bone resorption and University of North Carolina (UNC) probe checked the depth of attachment loss of the abutment teeth that receive the cast coping (nonattachment control group), customized post and stud attachment, and prefabricated access post.

Statistical Analysis Used: Oneway ANOVA test and *post hoc* Bonferroni multiple test.

Results: statistical analysis reveals the comparison of distinction between groups is significant at $P < 0.05$. The control group records least bone resorption and attachment loss than Group II and Group I. However, Group II records marginally higher bone resorption and attachment loss than Group III.

Conclusion: The result of the study within the physiologic limit analyze that, cast coping records least bone resorption and attachment loss followed by Customized post with stud attachment and prefabricated access posts. The prefabricated access post records higher bone resorption and attachment loss.

Keywords: Access post, attachment loss, bone resorption, Rhein 83 stud attachment, University of North Carolina-15 probe

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INTRODUCTION

In the current clinical practice of overdenture attachments, prefabricated access post and customized post with stud attachments are routinely used. There are several clinical case reports published in various journals about these post systems.[1-5] The main significant advantage of these post system is that, it produces immediate retention and stability to complete denture irrespective to ridge foundation and is benefitted to the patient.[6] The patient feels a sense of security and shows more cooperation and the clinician gets a sense of relief, particularly in patients with moderate-to-poor ridge foundation where the retention and stability is a substantial problem.[6] These post systems are easily available and economical as compared to implant supported overdenture. Other advantages of these post systems are that it improves the masticatory performance and controlled mandibular stability.

There are no long-term or retrospective studies that show survival of these post systems under complex intraoral stresses. The long-term prognosis of the overdenture depends on health of the abutment tooth. The support to the abutment tooth is mainly provided by the alveolar bone along with periodontal and gingival attachment. The amount and type of bone surrounding the abutment tooth, pocket depth, and severity of gingival recession predict the support to abutment tooth. The masticatory stresses are complex in nature and vary with different individual.[7] The amount of masticatory stresses in tooth supported overdenture is less as compared to full complement of teeth. However, the nature and magnitude of the stress is crucial for an overdenture post, as the amount of stress generated should be equal to the amount of strain produced from the support of overdenture abutment. The principle of force distribution as shown by Glickman,[8,9] Dotto *et al.*,[10] Lindhe and Svanberg,[11] and Caputo and Standlee[12] have reported the effect of adverse occlusal stresses on the teeth, alveolar bone, and periodontal ligament which shows that, there is loss of alveolar bone, marginal bone resorption, vertical bony defect, thickening of lamina dura, and periodontal pocket. Adverse occlusal stress changes the pathway of gingival inflammation to the underlying tissues and proceeds to spread to the periodontal ligament rather than the bone.[13] Complex intraoral stresses reduce the amount of bundle bone and increases osteoclastic activity.[14] The extreme heavy occlusal stress may decrease blood flow and subsequent bone resorption by osteoclast.[15] This traumatic damage to the periodontal tissue may suppress resorption of not only the bone surface but also the underlying bone.[16,17] The significant unknown problem for the overdenture post system is the relation between (overdenture treatment) OT cap/nylon cap to the stud attachment. The OT/Nylon caps are tightly secured to stud attachment onto the abutment teeth and that may create stress concentration onto the abutment teeth and interdental crest of the alveolar bone. Hence, the amount and distribution of the occlusal stress to the abutment teeth is a crucial factor while selecting the post for overdenture. The research about the tooth supported overdenture is limited to caries, plaque control, attachment loss, and retention of the overdenture attachment. Therefore, control observation study is needed to evaluate the status of hard- and soft-tissue surrounds abutment teeth under complex intraoral stress. On the similar line, the study was planned to evaluate marginal bone resorption and attachment loss in customized post- and pre-fabricated access post for mandibular overdenture.

MATERIALS AND METHODS

It is an observational study which evaluates the status of the bone using the cone-beam computed tomography (CBCT) and soft-tissue attachment, using University of North Carolina (UNC-15) probe, as a 1 year follow-up study.

A total of 30 patients of either sex between the age group of 50 and 70 years were selected from the Outpatient Department of the Prosthodontic Department using simple random sampling technique; $n = ([Z_{\alpha/2} + Z_{\beta}]^2 \times 2\times \sigma^2)/(d)^2$. The patients were future divided into three groups, as per the three materials used for the study. The divisions of patients are as follows:

1. Group I (Control group) – Cast coping Ni-Cr alloy (Ruby Dental Products INC, Japan)
2. Group II (Test group) – Customized post with stud attachment (Rhein 83, Bologna, Italy)
3. Group III (Test group) – Prefabricated access post (Essential Dental Systems, USA).

The pilot study was completed and presented in front of the ethical committee of the institute and appropriate consent was obtained for the same.

Abutment selection

The selected abutment tooth was either canine and/or premolar or both canine and premolar present bilaterally on a mandibular arch. The soft-tissue attachment was measured using Williams graduated periodontal probe. The abutment tooth which showed sulcus depth of >6 mm and moderate-to-severe gingival recession were excluded from the study. The intraoral periapical radiograph (Eastman Kodak Company, America) was taken to evaluate the status

of bone. The abutment tooth which showed two-third to half bone radiographically was included in the study.

The presence of periapical pathology, thickening of lamina dura, and periapical cyst radiographically were excluded from the study. The abutment tooth which showed severe decay, any previous or persistence trauma was excluded from the study.

Selection of edentulous ridge

The height of the residual ridge was measured by William graduated periodontal probe. The height was measured at the anterior portion of the ridge, on both the labial and lingual sides. The height was measured from the base of the sulcus to the crest of the residual ridge. The Vernier caliper was used to record the width of the residual ridge. The residual ridge which showed height <8 mm and width <4 mm was not included in the study.

The residual ridge which showed any bony protuberance, flabby ridges, and knife-edge ridge were not included. The patient with poor neuromuscular coordination, geriatric and medically compromised patients were not included in the study. The ridge contour should approximately simulate Atwood order number 5, as proposed by Atwood classification of residual alveolar ridge.

The procedure was explained to the patient and verbal and written consent was obtained. Endodontic treatment of selected abutment tooth was carried out prior to tooth preparation. Biomechanical tooth preparation was carried out as per the criteria mentioned in the textbook.[18]

The postspace impression for the cast coping and customized post with stud attachment was recorded using the pin-jet post luted with the pattern resin (LS 1:1 PKG GC America INC for patterning). The cast coping was fabricated by direct method. The single piece of the plastic pattern of the post and the coping was cast into the Ni-Cr alloy (Ruby Dental Products INC, Japan). The customized post was fabricated by the indirect method in that, the post space impression and the coping were fabricated initially and subsequently secondary impression was made into the medium fusing elastomeric impression material (MDM Corporation, India). Once the impression was retrieved, the post was lubricated to ensure easy removal after the fabrication of the model. The impression as poured in die stone (Ultrarock Type IV). In the next procedure, a plastic stud was attached to the center of the coping using heat-pressing machine. The entire plastic pattern with stud attachment was cast in Co-Cr alloy (Bego Wironit® extrahart, Germany). The preparation of the

Figure 1: Cast coping cemented with 34 and 45

Figure 2: Customized post cemented onto tooth 34 and 44 with cast coping on 45

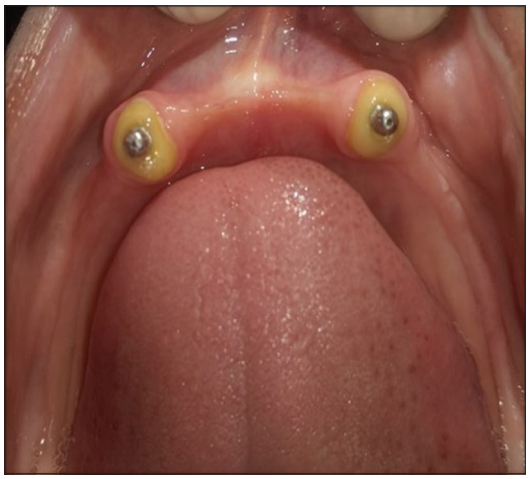

Figure 3: Prefabricated access post cemented on 34 and 44

prefabricated post was done at the denture insertion visit. The postpreparation was carried out as per the diameter and the length of the post.

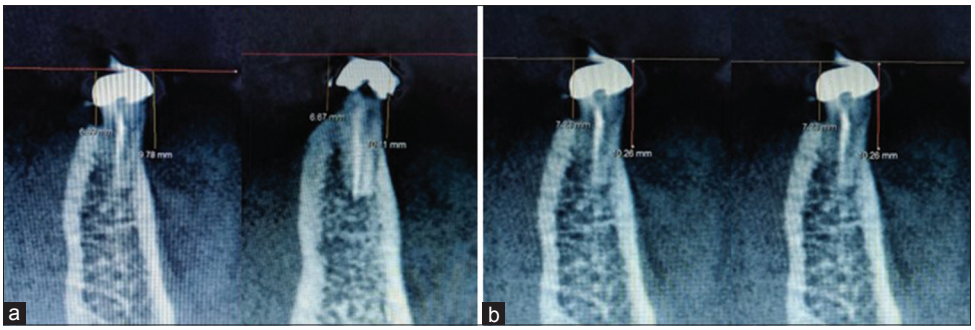

Figure 4: (a) Pretreatment cone-beam computed tomography taken just prior to the denture insertion. (b) Posttreatment cone-beam computed tomography taken 12 months after the denture insertion (Cast Coping)

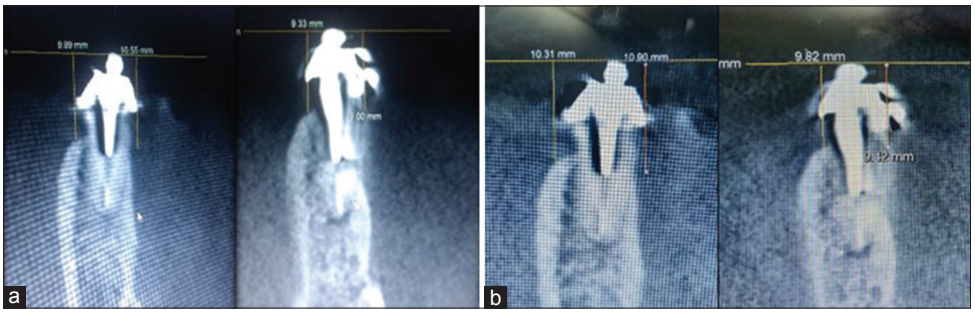

Figure 5: (a) Pretreatment cone-beam computed tomography taken just prior to the denture insertion. (b) Posttreatment cone-beam computed tomography taken 12 months after the denture insertion (Customized post and stud attachment)

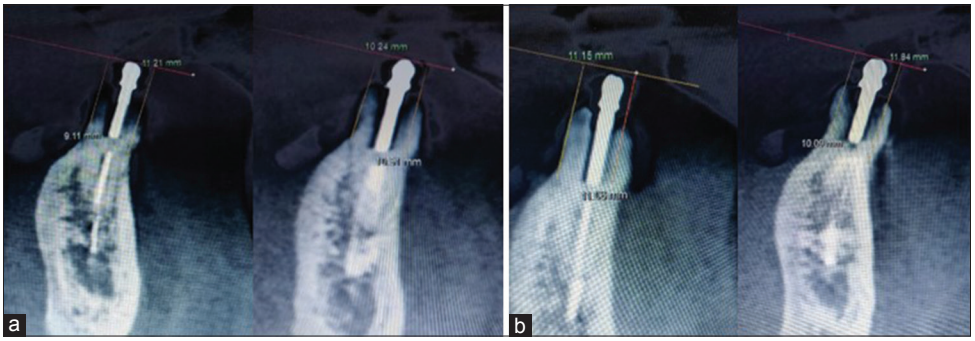

Figure 6: (a) Pretreatment cone-beam computed tomography taken just prior to the denture insertion. (b) Posttreatment cone-beam computed tomography taken 12 months after the denture insertion (Pre-fabricated access post)

Figure 7: Soft-tissue attachment level measured using University of North Carolina-15 probe (Cast Coping)

The cast coping, prefabricated access post, and customized post with stud attachment were cemented using dual-cure resin cement (3M ESPE Dental Products, USA). The cast coping was cemented prior to the secondary impression [Figure 1]. Customized post with stud attachment was cemented after the completion of secondary impression [Figure 2]. Prefabricated access post was cemented at the stage of denture insertion [Figure 3].

Pre-CBCT radiograph was taken just prior to the denture insertion for coping, prefabricated post, and customized post with stud attachment [Figures 4a, 5a and 6a] and the posttreatment CBCT was taken after 12 months [Figure 4b, 5b and 6b].

The soft-tissue attachment was measured using UNC-15 probe [Figures 7-9]. This probe was selected because it is a 15-mm long probe with markings at every 1 mm and color coding at 5, 10, and 15 mm that makes it easier to measure the soft-tissue attachment.

The soft-tissue attachment was measured just prior to the denture insertion and subsequently at 3, 6, 9, and 12 months according to Merin's classification for recall intervals in patients undergoing periodontal treatment.[19]

All the data were collected and tabulated for further statistical analysis. The data obtained were analyzed with the help of SPSS version 18 software (IBM, India). The level of significance (alpha level) was taken as 5% and *P* value was considered statistically significant if $P \leq 0.05$. Comparison between three groups for alveolar bone resorption for both the tooth from denture insertion to 12 months was done by using one-way ANOVA test. Furthermore, pair-wise comparison was done between the three groups using *post hoc* tests: Bonferroni multiple test.

RESULTS

The result of the study was divided into two parts that are as follows:

Part I: Evaluation of alveolar bone

Buccal bone resorption

Comparison between three groups for buccal bone resorption for both the tooth from denture insertion to 12 months was done using one-way ANOVA test. It revealed that, the mean difference was highest with prefabricated access post group and least with customized post with stud attachment group, and this difference found was highly significant statistically.

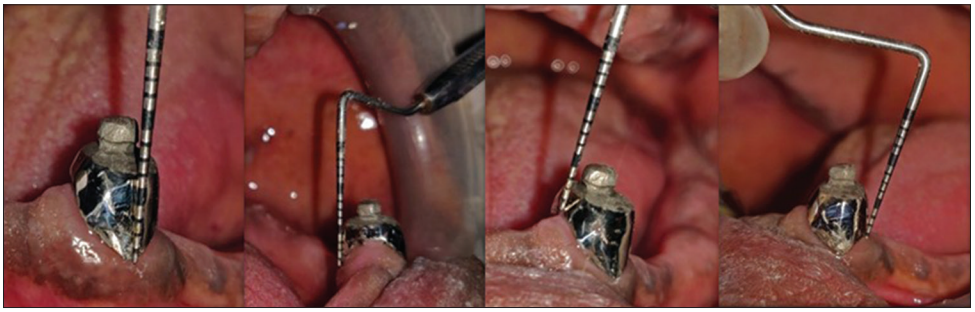

Figure 8: Soft-tissue attachment level measured using University of North Carolina-15 probe (CUstomized post and stud attachment)

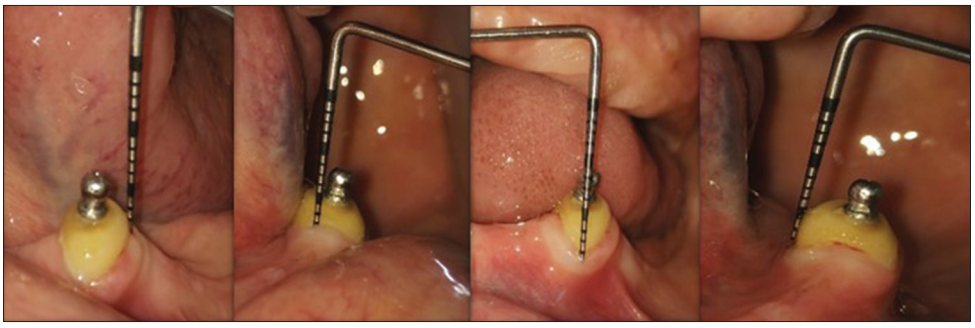

Figure 9: Soft-tissue attachment level measured using University of North Carolina-15 probe (Pre-fabricated access post)

Table 1: Buccal bone resorption difference between denture insertion to 12 months

Buccal bone resorption difference between denture insertion to 12 months	*n*	Mean	SD	*F*	df	*P*
Cast coping	10	0.44	0.093	25.1	2	<0.001; highly significant
Customized post with stud attachments	10	0.45	0.095			
Prefabricated access post	10	0.72	0.114			
Total	30	0.54	0.165			

SD: Standard deviation

Table 2: Inter-group pair-wise comparison using *post hoc* tests: Bonferroni test

Buccal bone resorption	Groups (I)	Groups (J)	Mean difference (I-J)	SE	Significant
Denture insertion to 12 months	Cast coping	Customized post with stud attachments	−0.01	0.0465	1.000
		Prefabricated access post	−0.28*	0.0465	0.000
	Prefabricated access post	Customized post with stud attachments	0.28*	0.0465	0.000

*The mean difference is significant at the 0.05 level. SE: Standard error

Table 3: Lingual bone resorption difference between denture insertion to 12 months

Lingual bone resorption difference between denture insertion to 12 months	*n*	Mean	SD	*F*	df	*P*
Cast coping	10	0.40	0.087	8.8	2	<0.001; highly significant
Customized post with stud attachments	10	0.37	0.096			
Prefabricated access post	10	0.54	0.114			
Total	30	0.44	0.125			

SD: Standard deviation

Table 4: Inter-group pair-wise comparison using *post hoc* tests: Bonferroni test

Lingual bone resorption	Groups (I)	Groups (J)	Mean difference (I-J)	SE	Significant
Denture insertion to 12 months	Cast coping	Customized post with stud attachments	0.028	0.0453	1.000
		Prefabricated access post	-0.11	0.0468	0.071
	Prefabricated access post	Customized post with stud attachments	0.171	0.0453	0.001

The mean difference is significant at the 0.05 level. SE: Standard error

Table 5: Difference of attachment loss between denture insertion to 12 months

Difference of attachment loss between denture insertion to 12 months	*n*	Mean	SD	*F*	df	*P*
Mid-buccal						
Cast coping	10	0.40	0.699	0.25	2	0.784
Customized post with stud attachments	10	0.30	0.483			
Prefabricated access post	10	0.50	0.707			
Total	30	0.40	0.621			
Mid-lingual						
Cast coping	10	0.00	0.000	0.99	2	0.385
Customized post with stud attachments	10	0.30	0.675			
Prefabricated access post	10	0.30	0.675			
Total	30	0.20	0.551			
Mid-mesial						
Cast coping	10	0.10	0.316	0.27	2	0.769
Customized post with stud attachments	10	0.10	0.316			
Prefabricated access post	10	0.20	0.422			
Total	30	0.13	0.346			
Mid-distal						
Cast coping	10	0.00	0.000	0.50	2	0.612
Customized post with stud attachments	10	0.10	0.316			
Prefabricated access post	10	0.10	0.316			
Total	30	0.07	0.254			

**P* value is significant. SD: Standard deviation

The values for buccal bone resorption are shown in Table 1.

Furthermore, pair-wise comparison was done between the three groups using *post hoc* tests: Bonferroni test [Table 2].

It revealed that the mean differences were significant between prefabricated access post and customized post with stud attachment as well as between prefabricated access post and cast coping (control group). However, there was no significant mean difference between cast coping and customized post group.

The values for *post hoc* tests are shown in Tables 3 and 4.

Lingual bone resorption

Similar to buccal bone level, lingual bone resorption for the three groups was done using one-way ANOVA test. It revealed that the mean difference was highest with prefabricated access post group but was least for customized post with stud attachment.

The values for lingual bone resorption are shown in Table 3.

Furthermore, pair-wise comparison was done between The Three Groups Using *Post Hoc* Tests: Bonferroni test [Table 5].

It revealed that the mean differences were significant between prefabricated access post and customized post with stud attachment as well as between prefabricated access post and cast coping (control group). However, there was no significant mean difference between cast coping and customized post group.

Part II: Evaluation of soft-tissue attachment loss

Difference of attachment loss between denture insertion and 12 months

Comparison between three groups for attachment loss values from denture insertion to 12 months was done using one-way ANOVA test.

It was observed that, there was more mean attachment loss for tooth no 33/34/35 in prefabricated access post group at mid-buccal as well as at mid-mesial surface, while cast coping group had less mean attachment loss at mid-lingual as well as at mid-distal surface, and customized post group had less mean attachment loss at mid-lingual as well as at mid-distal surface as compared to other groups. However, these differences found among groups were not significant statistically.

It was observed that, there was more mean attachment loss for tooth no. 43/44/45 in prefabricated access post group at mid-buccal, mid-lingual, mid-mesial, and mid-distal surface as compared to other groups. However, these differences found among groups were not significant statistically.

DISCUSSION

The most important component of the overdenture therapy is the abutment tooth. The abutment tooth not only maintains the proprioception but also it gives extensive platform to various attachments that improve retention and stability of the complete denture, irrespective of the ridge foundation.[20,21] The success of the overdenture post systems depends on the stress–strain ratio between the complex intraoral stress and the support of the abutment tooth.

There are various attachments used for an overdenture; however, currently, prefabricated access post and customized post are the two most favored post system, preferred by many practitioners. These post systems are economical and easy to place as compared to implant supported overdenture. It may reduce the frequent recall visits after the denture insertion due to minimum adjustment required by the patient as the overdenture post produce secure retention. However, the retention must be caution against the amount of stress generated by these attachments. There is no long-term study that shows the response of alveolar bone to the stress generated by these post systems. The dissipation of stress on abutment surface and subsequently to the long axis of the tooth under the complex intraoral forces using these post systems is not discussed in any current or previous literature. Hence, the controlled observational study was needed and planned to evaluate the status of bone mechanism under the post systems, so that prognosis of the abutment tooth can be improved.

The patients were selected from the age group of 50–70 years. The patients above the age of 70 years were not included in the study, as most of them are either medically compromised or have age-related problem and insufficient ridge foundation. The randomized block design concept was used for the selection of the patient. The patients were divided into three groups as per the age for the evaluation of the inclusion criteria. The first group was between the age of 50 and 55 years, the second group between the age of 55 and 60 years, and the third group between the age group of 60 and 70 years. The ten patients from each group were selected for the study. The advantage of this design is that, the variability within the group is less compared to the variability between the groups. The subjects were further randomly assigned into three groups as per the three materials used for the study.

The abutment tooth selected for the study was either canine or premolar or both canine and premolar present bilaterally. These teeth show maximum number of proprioceptors, particularly canine and canine tooth has a long root. However, if the canine is not present or extracted for any reason, then the preference was given to the first or second premolar.

The abutment tooth which showed sulcus depth >6 mm was not included in the study because the sulcus depth up to 6 mm can be maintained easily by scaling and root planning.[22]

There is no standardized method that shows the minimum height and width of the residual ridge for retention and stability. Hence, the ridge height and width were measured using William graduated probe and vernier caliper, respectively. The anterior ridge portion was selected to record the height and width, as in many cases, these portions of the mandibular ridge show least bone height and width.[17]

The cast coping was considered as a control group because it allows to transfer the forces to the long axis of the tooth and minimize the stress concentration on the abutment tooth.[6]

The pre-CBCT was taken prior to denture insertion and post-CBCT was taken after 12 months from the date of denture insertion. CBCT is a recent diagnostic three-dimensional means of measuring alveolar bone level. It gives 80%–100% sensitivity than periapical radiograph and it produces less exposure than periapical radiograph.[23-25] Twelve-month period was selected, as any loading on bone required at least 6–12-month period for bone remodeling.[26]

Attachment loss was measured with UNC probe. It is a 15-mm long probe with markings at every 1 mm and colure coding at 5, 10, and 15 mm. This particular configuration of probe allows better measurement of attachment loss.

Attachment loss was measured prior to denture insertion and subsequently at 3, 6, 9, and 12 months as per the classification mentioned by Merin for recall interval in patients undergoing periodontal treatment.[20] Attachment loss was measured from the most occlusal part of the abutment tooth as suggested by Ramfjord.[27]

The result of the study was statistically significant ($P \leq 0.05$). That means, the control group showed the least bone resorption and attachment loss. However, Group II showed marginally higher mean that the control group for bone resorption ($P \leq 0.05$). The Group III shows highest mean for bone resorption.

The result of the study noted that, cast coping showed the least bone resorption. This particular observation could be true, as it is a simple metal covering on the occlusal portion of the abutment tooth, that protects the tooth from secondary decay, trauma, and prevents plaque accumulation.

Customized post shows marginally higher bone resorption than cast coping. The prefabricated post shows highest bone resorption than cast coping and customized post. The difference of bone resorption values could be due to the following reason:

Postspace impression and cementation

The customized post was fabricated using indirect method; therefore, it is precisely cemented into the root canal and allowed better force distribution toward the long axis of tooth. The prefabricated post does not fit accurately into the root canal because the preparation of the root canal does not match with the length and diameter of the prefabricated post. Particularly, in thin, narrow, and calcified canals. In many situations, the height of the post has to be reduced or modified at the apical areas. Overall, the fit of the prefabricated post was not very precise into the root canal and that could one of the reasons of higher bone resorption.

Stud attachment

In customized post, the plastic stud is heat pressed on the center of coping before it gets cast as a one piece. This particular feature is benefitted to the abutment tooth, such that the stud will always be placed on the center of the tooth, irrespective of the inclination of the tooth. It allows to transfer the force more parallel to long axis of tooth. However, in the same situation, prefabricated post stud is not always on center on the tooth. In case of tilted tooth, it is situated on the orifices of the root canal and that creates an angle with long axis of the tooth, hence the force is multiplied in proportional to the angle formed by stud attachment to long axis of the tooth. This particular force produces more torque on abutment tooth[28] [Figure 10].

Cost and maintenance

The customized post is costlier than the prefabricated post. It is time-consuming, as it requires extra laboratory step for its fabrication. Any damage or misfit of the OT-cap requires to send the lower denture for the reprocessing, as replacement of the new OT-cap cannot be done as a chair-side procedure. It is not only time-consuming, but also increases the cost of the prosthesis, thereby, increasing load on both the patient and the practitioner. The prefabricated post is economical than the customized post and is not time-consuming, as it a chair-side procedure that can be completed during denture insertion visit. Any misfit or damage to the nylon cap can be removed and replaced with the new one at chair-side reline procedure.

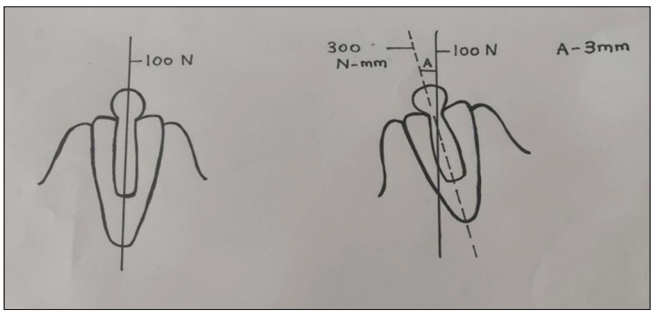

Figure 10: An offset occlusal load will magnify the forces by the length of the inclination. For example: A 3 mm inclination will increase a 100 N to a 300-N-mm

Hence, it not only reduces time, but is also convenient for both the patient and the practitioner.

The result of the present study was supported by the previous research carried out by Araújo and Lindhe.[14] They conducted their study on the resorption pattern of alveolar bone under complex adverse stress. The result of the study stated that, there is loss of coronal structure of the bone under extreme complex adverse forces. In fixed partial denture, any adverse stress on one end of the retainer generates severe torque on the alveolar bone and causes marginal bone resorption was reported by Caputo (1987).[12] Several studies related to trauma from occlusion and the alveolar bone with different parameters suggested one common conclusion, that was, adverse trauma to the alveolar bone via periodontal ligament produces marginal bone resorption, gingival recession, angular defects, and infrabony pockets.[8,10-12] However, the results of the present studies was contradicted by the previous research. The Crum and Rooney,[29] Pacer, and Bowman[30] suggested that, the proprioceptor feedback mechanism in periodontal ligament creates an occlusal awareness and reduces the rate of alveolar bone resorption. However, occlusal studies show that, the proprioceptor feedback mechanism create an occlusal awareness, so that the muscle of mastication takes the mandible to the most favorable closing position.[31] Similarly, evidence from bone research study suggested that, any loading on the bone, either due to fixed partial denture, overdenture attachments, or orthodontic attachments, the bone sets up two mechanism; if the loading is favorable, the bone shows adaptive response by stimulating osteocytes that converts into osteoblasts, subsequently producing lamellar bone, and if the load is severe, then there is resorption of bone by stimulating osteocytes that convert into osteoclast subsequently forming woven bone.[17,18] Trulsson and Essick mentioned that several fibers present in the periodontal ligament are required for slow-adapting afferents to elicit conscious sensations. The function of the slow adapting fibers is to regulate the masticatory force, oral posture, and motor control.[32]

The means of the soft-tissue attachment loss was not significant in all the three groups. However, the unpaired mean was higher for the prefabricated post. This observation may be true, because cast post and customized post shows less plaque accumulation at the gingival marginal than the prefabricated post, irrespective of oral hygiene program demonstrated to the patient. The cast coping and the coping of the customized post was highly polished; hence, they attract less plaque accumulation at the gingival margin area. The prefabricated post produces higher torque that could be change the pathway of gingival inflammation and subsequently produces loss of attachment. Similar findings were also observed by Biancu *et al.* (1995).[13]

The most significant observation of the present study is the essentiality and selection of attachment mainly depends on the status of the hard and soft tissue of the abutment tooth. However, several other factors that directly or indirectly affect the attachment selection were occlusal forces, the angulation of the abutment tooth, bilateral parallelism of the abutment tooth, the interridge distance, and health and the age of the patient.

Hence, the study proposed overdenture treatment planning into three categories that are as follows:

Category 1

If the clinical case represents healthy ridges where the height and width of the ridge are adequate, the abutment tooth shows sufficient bone present radiographically around the abutment tooth and healthy soft-tissue attachments present clinically.

In such a case, simple short and long copings can be best used because retention and stability are provided by the residual alveolar ridge. The main aim of preserving the tooth is to maintain the support of the alveolar bone and create occlusal awareness. If sufficient teeth are present bilaterally, then telescopic copings are the best treatment option.

Category 2

Residual ridge with mild bone resorption along with two-third-to-half bone surrounding the abutment tooth radiographically with healthy gingival attachment presents clinically. There should be no extreme inclination of the abutment tooth and the abutment tooth should be parallel to each other.

In such cases, prefabricated access post can be used, considering the remaining health of the hard and the soft tissue. It may be anticipated that, bone should have sufficient amount of strain to withstand the forces which are encountered at the stud area within physiological limit. However, frequent follow-up is necessary to evaluate the hard- and soft-tissue attachment, so that the prognosis of the abutment tooth can be maintained for a longer duration.

Category 3

Residual ridges with moderate-to-severe bone resorption with at least half of the bone surrounding the abutment

tooth with minimum pathological changes in the soft tissue.

Customized post can be selected for such cases, as the post has a more precise fit into the root canal and the stud is placed on the center of the tooth which provides even distribution of forces to the long axis of the tooth and the bone.

The above categories were made on the basis of clinical observation of the hard and soft tissue attachment present around the abutment tooth.

Considering all the dependent and independent variables of the study, the present study proposed that, prefabricated post shows higher bone resorption and attachment loss as compared to cast coping and customized post with stud attachment. The study needs further evaluation along with histological findings for more precise observation of the hard and soft tissue so as to improve the prognosis of the treatment.

SUMMEERY AND CONCLUSION

The present study was carried out to evaluate the amount of marginal bone resorption and soft-tissue attachment loss for prefabricated access post and customized post with stud attachment-1-year follow-up study. The following study was done with an objective to evaluate and compare the effect of cast coping, prefabricated access post, and customized post with stud attachment on hard- and soft-tissue attachment for mandibular overdenture.

A total of 30 patients of either sex between the age group of 50 and 70 years were studied. The bone resorption was measured using CBCT just prior to the denture insertion and after 12 months. The soft tissue attachment loss was measured using UNC-15 probe just prior to denture insertion and after 3, 6, 9, and 12 months.

Within the limitations of the study, the following conclusions can be drawn:

1. Cast coping shows the least amount of alveolar bone resorption and soft-tissue attachment loss when compared to prefabricated access post and customized post with stud attachment
2. Prefabricated access post shows higher amount of alveolar bone resorption and soft-tissue attachment loss when compared to cast coping and customized post with stud attachment
3. The amount of alveolar bone resorption and soft-tissue attachment loss for customized post with stud attachment was higher than the cast coping but lower than that of the prefabricated access post
4. The study also revealed that, the case selection for an overdenture attachment depends on the status of the bone and soft-tissue attachment and the mechanical loading.

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Conflicts of interest

There are no conflicts of interest.

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