# Periodontal implication of bonded and removable retainers: A comparative study

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## Article Info

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## Abstract

The purpose of this study is to compare the periodontal health of the lower anterior teeth retained with the use of removable and fixed retainers. Fifty four cases receiving comprehensive orthodontic treatment in between 10 to 30 years were randomly selected and divided into 2 groups of 27 each. One group was given removable retainers and other was given fixed retainers. The periodontal status of the patients was accessed with bleeding on probing index, Plaque index and Calculus index. The mean plaque index in case of removable retainers at 1st, 3rd and 6th month were 0.5, 1.0 and 1.7 where as in case of fixed retainers that were 1.8, 3.0 and 4.5. The mean dental calculus index in case of removable retainers at 1st, 3rd and 6th month were 0.0, 0.1 and 0.1 where as in case of fixed retainers that were 0.1, 0.9 and 1.8. In conclusion, removable retainers are superior in oral hygiene maintenance, yet the use of fixed retainers cannot be denied.

## Introduction

Appliances which are used in orthodontics practice are broadly classified as removable and fixed appliance by which retention can be achieved. Removable appliances used are Hawley's appliance and Essix retainers. However, the most commonly used removal appliance is Hawley's appliance.[1] Hawley's appliance is made of acrylic palatal portion and labial bow is made of stainless steel wire 0.020 to 0.036 inch, whereas Essix retainer typically consist of a 0.030 inch plastic and all surfaces of the teeth are covered completely. Intra-arch instability is anticipated and prolonged retention is intended by the fixed retainers which are used normally.[2] It was first proposed by Zachrisson,[3] where he introduced individual tooth adjustment, multi-stranded wire bonded on the lingual surface of each tooth for retention for the longer period. There are various types of fixed retainers. The most commonly used are the mandibular canine to canine (3-3) bonded retainer bar (0.030 or 0.032 inch) and the thin wire is 0.0215 inch, flexible retainer and spiral wire retainer.[4, 5]

A retrospective study was concluded that bonded retainers were highly competent and dependable in maintaining tooth alignment.[6] In a survey in 2002, showed that one-third of orthodontic practitioners use mandibular fixed retainers and 5% use maxillary fixed retainers.[7] In 2011, those numbers has increased in mandibular arch about 42%, and in maxillary arch is about 11%.[8] To maintain routine oral hygiene position of the lower loop of the wave retainer is just slightly above the lingual interdental papilla to allow for normal flossing technique.[9] Use of long-term fixed retainer causes calculus accumulations, marginal recession and increase probing depths with long-term irritation of the tissue.[10] Recent study shows that increased plaque accumulations in the lower incisor region was not affected by bonded lingual retainers.[11] Fixed retainers are straight, single stranded, or braided stainless steel wire adapted to the lingual surface of the teeth and placed at the cingulum or slightly above.[12]

Hawley retainer includes an acrylic plate that rests behind the teeth and a labial bow that contacts the anterior teeth. Durability and adjustability of Hawley retainers are used during the retention period and allow for the post-treatment settling of the dentition.[13] In lower anterior region, fixed lingual retainers are the main alternatives to the traditional removable retainers. Hawley retainer's popularity has increased for esthetical purpose and virtually free of patient compliance. Drawbacks includes bond failures, stress fractures, time consuming placement procedure and the tendency for plaque and calculus retention.[14] The Magne Tainer™ is being introduced as an alternative for the fixed lingual retention.[15] Removable retainers are used for the long-term compliance and oral hygiene will not be compromised.[16] The development of caries favors the formation of calculus by continuous presence of the wires

which favors the plaque formation and food impaction.[17, 18]

The advantages of mandibular fixed inter-canine retainer compared with the removable retainer, they are invisible and well-tolerated by the patient.[19] On the other hand, the disadvantages are attributed to the demanding technique of placing the retainer and tooth movement due to distortion of the wire.[20]

## Materials and Methods

This cross-sectional study was done from November 2013 to June 2014. Fifty four patients (age range: 10-30 years) received comprehensive orthodontic treatment and fulfilled the inclusion and exclusion criteria. Inclusion criteria were: a) patients undergoing fixed orthodontic treatment, b) patients with removable/fixed retainers, c) patients between age of 10 and 30 years. The modified plaque index, according to Quigley and Hein (modified according to Turesky) was, registered for buccal and lingual tooth surfaces according to the following scale: No plaque – 0, spots of plaque at the cervical margin– 2, gingival third of tooth surface covered with plaque– 3, two thirds of tooth surface covered with plaque– 4, more than two-thirds of tooth surface covered with plaque– 5. To measure the amount of dental calculus, a calibrated periodontal probe was applied at three location of the buccal and lingual sides of each lower incisor and canine, a mesial location, at the tooth center and distal location.

## Results

Among the 54 cases given retainers, 27 were given removable and 27 were given fixed retainers. 11 males got removable retainers and 5 males got fixed retainers, 16 females got removable retainers and 22 females got fixed retainer.

**Table I**

**Mean plaque index and dental calculus index after different time**

| | Removable retainer | Fixed retainer |
|---|---|---|
| *Plaque index* | | |
| 1 month | 0.5 | 1.8 |
| 3 months | 1.0 | 3.0 |
| 6 months | 1.7 | 4.5 |
| *Dental calculus index* | | |
| 1 month | 0.0 | 0.1 |
| 3 months | 0.1 | 0.9 |
| 6 months | 0.1 | 1.7 |

Table I shows the observation of fixed and removable retainers on 1 month, 3 months and 6 months follow-up. It has been observed that 6 months visit has higher indices reading and 1 month follow-up has the lowest indices reading.

For male and female population on ANOVA test, plaque index was significant and dental calculus index were not significant.

## Discussion

In present study it was found that, the mean plaque index in case of removable retainers at 1st, 3rd and 6th month were 0.5, 1.0 and 1.7 where as in case of fixed retainers that were 1.8, 3.0 and 4.5. The mean dental calculus index in case of removable retainers at 1st, 3rd and 6th month were 0.0, 0.1 and 0.1 where as in case of fixed retainers that were 0.1, 0.9 and 1.8. At one month follow-up the indices were recorded least than the 3 months and 6 months and it was the highest at the 6 months follow-up.

Orthodontic treatment does not end when appliances have been removed and concerned about the stability after completion of active orthodontic treatment and lifetime retention is necessary to maintain satisfactory alignment.[21] Many literatures have shown that relapse after completion orthodontic treatment is unpredictable.[21-23] In a study of 428 retention patients showed that 20% of patients were not wearing their retainers after 2 years, but 45% were wearing them every night and 80% at least 1 night per week.[24] Silness and Loe's plaque index system is similar to their gingival index system in that it is used to clearly distinguish between the severity and location of soft debris aggregate.[25] In another study, it was found that there was slightly more plaque and calculus present in the fixed retention group. However, this did not result gingival inflammation than in the removable retainer group.[26] Another study has shown significant difference between the fixed retainers and removable retainers group, whereas other studies have shown that there is no statistical significant difference among different indices recorded from removable and fixed retainers on follow-up visit although the recording of indices were high.[27]

Significant differences in the gingival conditions exist between the patients who wear removable or fixed retainers. Retention is usually necessary following the orthodontic treatment to overcome the elastic recoil of the periodontal supporting fibers and to allow remodeling of the alveolar bone. In the present study, plaque and calculus accumulation are more in the fixed retainer than the removable retainer.

## Conclusion

The oral hygiene status of the group with fixed retainers was compromised and removable retainers was better. All the oral hygiene indices showed higher in the fixed retainers groups. Removable retainers are superior in oral hygiene maintenance, yet the use of fixed retainers cannot be denied.

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