Research Article

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Comparison of Fibre Reinforced Polymer Retainers and Stainless Steel Orthodontic Retainers

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ABSTRACT

Background: Orthodontic retainers are frequently used to prevent the relapse of crowding. The present study was conducted to compare fiber reinforced plymer retainers and stainless-steel orthodontic retainers.

Material and methods: The present study was conducted to compare two different orthodontic retainers that is Fibre Reinforced Composite retainers and a multistrand stainless steel wire. Patients were randomly assigned to one of two groups. In the first group was applied a multistrand stainless steel wire and in the second one a fiber-reinforced resin composite. The retainers were applied in the mandibular arch from right to left canine. Since bonding of the retainer all patients were followed with periodic monitoring visits at 30, 60 days to evaluate detachments. 0.0175″ multistranded wire and fiber reinforced resin preimpregnated with Transbond XT Primer (3M Unitek) were used. Each patient was asked to express an opinion about the esthetic result such as visibility of the retainer while talking and smiling by means of VAS (Visual Analogue Scale) in which the 0 point means poor esthetic result effect and 10 means excellent esthetic effect. Statistical analysis was performed using the Statistical Package for the Social Sciences software version 21.0 (SPSS Inc., Chicago, IL, USA).

Results: The result showed that with stainless steel wire detachment was 24.16% while with fibre reinforced resin detachment was 12.5%. The mean value of satisfaction with stainless steel wire was 7.89±2.45 and with Fibre reinforced resin 9.45±0.67.

Conclusion: Our study concluded that Fibre reinforced resin retainers shows better result than stainless steel wire retainers as patients were more satisfied esthethically with fibre reinforced retainers and tooth detachments were also less with fibre reinforced retainers.

Keywords: Multistranded wire, fiber reinforced resin, retainers.

INTRODUCTION

Retention is observed as an imperative phase of orthodontic treatment due to relapse or return tendency of natural teeth without any type of retention to their initial positions.[1] In orthodontic cases where long-term retention is required, bonded lingual retainers are mainly used whereas in case of periodontally involved teeth, permanent splinting is used.[2] It is important to consider future growth of the jaw during deciding duration of retention and that too for each case specifically in

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conjunction with the patient.[3,4] Spiral or multistrand wires seem to be the most common for direct-bonded retainers.[5] The use of multistrand wire offers benefit of increased mechanical retention for the composite due to its irregular surface without the need for the placement of retentive loops.[6] Furthermore, another positive feature is the flexibility of the wire which allows physiologic movement of the teeth, even though several adjacent teeth are bonded.[7] The use of fiber-reinforced composites (FRCs) has offered a potential option to bonded metal wires for fixed orthodontic retention. FRCs shows desired properties due to their high stiffness-weight (specific modulus) and strength-weight (specific strength) ratios as compared with those of other structural materials.[8,9] The enhanced load-bearing capabilities and specific modulus of elasticity of the polymers allows exciting possibilities for several applications in orthodontic practice, particularly in relation to better esthetics and the ease of manipulation as compared with those of stainless steel and metal alloys.[10,11,12] The present study was conducted to compare fiber reinforced polymer retainers and stainless steel orthodontic retainers.

MATERIAL AND METHODS

The present study was conducted among 40 patients in the finishing phase of orthodontic treatment to compare two dissimilar orthodontic retainers, multistrand stainless steel wire with fibre reinforced composite retainers. Ethical approval was taken from the ethical committee of the institution and written informed consent was signed by the patient before the commencement of the study. Patients with correct dental alignment, need for permanent orthodontic retention in the lower anterior segments, and being free of occlusal interferences in order to eliminate the influence of trauma were selected for the study. Patients were selected randomly in two groups. In the first group, a multistrand stainless steel wire (Ortosmail Krugg) and in the second one a fiber-reinforced resin composite (InFibra TPItalia) was applied. A total number of teeth bonded 120 teeth ,were bonded in each group. 0.0175'' multistranded wire and fiber reinforced resin preimpregnated with Transbond XT Primer (3M Unitek) were used. The retainers were applied in the mandibular arch from right to left canine. All patients were followed from bonding of the retainer periodically at 30, 60 days to evaluate if any detachments. Each patient was asked to express an opinion about the esthetic result such as visibility of the retainer while talking and smiling by means of VAS (Visual Analogue Scale) in which the 0 point means poor esthetic result effect and 10 means excellent esthetic effect. Statistical analysis was performed using the Statistical Package for the Social Sciences software version 21.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

The result showed that with stainless steel wire detachment was 24.16% while with fibre reinforced resin detachment was 12.5%. The mean value of satisfaction with stainless steel wire was 7.89±2.45 and with Fibre reinforced resin 9.45±0.67.

Table 1: Distribution of bond failures for the different retainer types (single tooth detachments)

Type of material	No. of bonded	No. of failed	%
Stainless steel wire	120	29	24.16%
Fibre reinforced resin	120	15	12.5%
Total	240	44	29.06%

Table 2: Descriptive statistics of VAS values.

Type of material	Mean
Stainless steel wire	7.89±2.45
Fibre reinforced resin	9.45±0.67

DISCUSSION

The result showed that with stainless steel wire detachment was 24.16% while with fibre reinforced resin detachment was 12.5%. The mean value of satisfaction with stainless steel wire was 7.89±2.45 and with Fibre reinforced resin 9.45±0.67.

Bearn et al reported that wires with a larger diameter and greater surface area require greater force to pull the wire out from the composite resin.[13] However, Baysal et al found that the Penta One wire exhibited the highest mean resistance to displacement from composite resin, even though it was not the wire with the largest diameter.[14]

The success of a bonded retainer depends on the size and quality of teeth, the occlusal load on the retainer, as well as minimum thickness of material used as considering that bulky structures may lead to plaque accumulation with reversible or irreversible damage to the enamel and dentin and occasionally irritate the tongue.[15-17]

Zachrisson evaluated 43 direct-bonded mandibular canine-to-canine retainers after observation period between 12 to 30 months. Results indicate that the bonded retainer has all the advantages of a fixed soldered retainer, in addition to being invisible. The failure rate in terms of loose retainers (11,6%).[18] Rose et al. demonstrated that ribbon-reinforced retainer remained in place for shorter period of time than multistranded wire.[19]

CONCLUSION

Our study concluded that Fibre reinforced resin retainers shows better result than stainless steel wire retainers as patients were more satisfied esthethically with fibre reinforced retainers and tooth detachments were also less with fibre reinforced retainers.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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