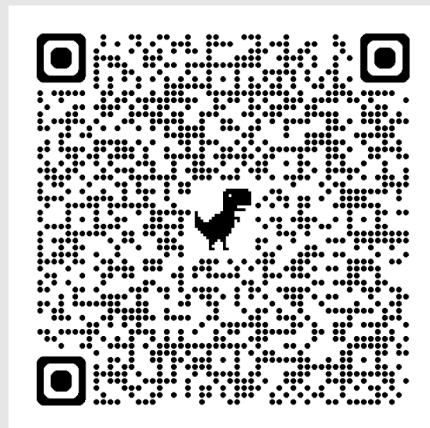


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Evaluation of wear amounts of different composite resin attachments used in clear aligner treatment over a 6-month period: a retrospective study

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ABSTRACT

Objectives: To compare surface wear among three different attachment composite resins over a 6-month follow-up period.

Materials and Methods: Intraoral scanning was performed on 28 participants immediately after initial bonding of attachments (T0), and at 1 (T1), 3 (T2), and 6 months (T3) after starting aligner treatment. In Group 1 (N = 154 attachments), Tokuyama Estelite Universal Flow; in Group 2 (N = 166 attachments), Filtek Z350 XT Universal Restorative; and in Group 3 (N = 161 attachments), G-enial Universal Injectable resins were used for bonding the attachments. The surface wear depth on attachments was measured using superimposed digitized models. Kruskal-Wallis and Friedman tests were used with a significance set at 5%.

Results: As treatment progressed, surface wear increased significantly in all groups ($P < .001$). The wear amount for Group 3 was significantly greater than that for Groups 1 and 2 at the 3-month period ($P < .001$). Regarding T0–T3 surface wear, Group 2 (0.03 mm) and Group 3 (0.0809 mm) exhibited significantly greater wear than Group 1 (0.0243 mm; $P = .024$ and $P < .001$). Surface wear was also significantly greater in Group 3 than in Group 2 ($P < .001$). No significant difference was observed in T3–T0 wear values between conventional and optimized attachments within each group.

Conclusions: The wear of orthodontic attachments was greatly influenced by the type of composite resin. During the third and sixth months of the clinical period, G-enial Universal Injectable resin demonstrated significantly greater surface wear than other resins. After 6 months, Tokuyama Estelite Universal Flow displayed the least surface wear. (Angle Orthod. 0000;00:000–000.)

KEY WORDS: Aligner; Attachment; Composite resin; Wear

INTRODUCTION

Clear aligner orthodontic treatment has grown in popularity and provides several benefits, including comfort, esthetics, and greater convenience for maintaining oral hygiene and periodontal health.^{1,2} Attachments for aligner therapy are crucial components that are bonded

to the labial or lingual surfaces of the teeth to improve aligner retention and aid in tooth movement.^{3,4}

Attachments are primarily distinguished by their shape: While conventional attachments are mostly rectangular, optimized attachments have varied and irregular shapes. During clear aligner therapy, it is essential to maintain the integrity of the attachments consistently. Surface wear can occur on the attachments due to factors like brushing, eating, removing, and reinserting the appliance. The attachments should resist mechanical stresses caused by the repeated removal and insertion of aligners.⁵ Active surfaces of the attachments play a crucial role in transmitting forces to the tooth surfaces. The wear of attachment surfaces may affect the efficiency of clear aligner therapy, as demonstrated in a recent finite element study by Li et al.⁶ In that study, the authors emphasized that, as wear of the attachments increased, the efficiency of distalization of the maxillary canines decreased. Additionally, stress resulting from the force during placement

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TEMBEL ÖZETİ

Ne Amaçlamışlar?

Clear aligner tedavisinde kullanılan ataşmanların 6 aylık klinik süreçte gösterdiği yüzey aşınmasının, kullanılan farklı kompozit rezin türlerine göre değişip değişmediğini değerlendirmeyi amaçlamışlardır.



Ne Yapmışlar?

Invisalign ile tedavi edilen 28 hastada, üç farklı kompozit rezinle hazırlanmış toplam 481 ataşman incelenmiştir. Ataşmanlar; *Tokuyama* *Estelite Universal Flow*, *Filtek Z350 XT Universal Restorative* ve *G-ænial Universal Injectable* kompozitleri kullanılarak yapıştırılmıştır. Tedavi başlangıcında (T0) ve 1., 3. ve 6. aylarda (T1, T2, T3) alınan intraoral taramalar STL formatında süperpoze edilerek ataşmanların bukkal yüzeylerindeki aşınma derinliği (mm) ölçülmüştür. Ayrıca optimized ve konvansiyonel ataşman tipleri arasında fark olup olmadığı analiz edilmiştir.

Results

Ne Bulmuşlar?

Tüm kompozit gruplarında ataşman yüzey aşınmasının zamanla anlamlı olarak arttığı gösterilmiştir.

- G-aenial Universal Injectable kompozit, özellikle 3. ve 6. aylarda diğer materyallere kıyasla anlamlı derecede daha fazla aşınma göstermiştir.
- Tokuyama Estelite Universal Flow kompozit ise 6 ay sonunda en düşük aşınma değerlerine sahip bulunmuştur.
- Filtek Z350 XT kompozit, aşınma miktarı açısından iki materyalin arasında yer almıştır. Ataşman tipinin (optimized veya konvansiyonel) aşınma miktarı üzerinde anlamlı bir etkisi saptanmamıştır.



Bu Ne Anlama Geliyor?

Clear aligner tedavisinde ataşman yüzey aşınması esas olarak kullanılan kompozit rezin tipine bağlıdır, ataşman geometrisine değil.

Daha düşük aşınma gösteren kompozitlerin tercih edilmesi, ataşmanların mekanik etkinliğinin korunması ve olası biyolojik etkilerin azaltılması açısından klinik olarak avantaj sağlayabilir.