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Title : THE IMPACT OF RECONDITIONED ORTHODONTIC BRACKETS ON BOND STRENGTH

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Introduction: Orthodontic bracket bond failure is common during orthodontic treatment. **Objectives:** To evaluate the Shear Bond Strength (SBS) of new orthodontic brackets, and the SBS after reconditioning and repeating the reconditioning procedure for such brackets, with and without bonding; and to evaluate the bond failure rate of new and reconditioned orthodontic brackets during orthodontic treatment. **Methods:** A total of 120-extracted human premolar teeth and 120 premolar stainless-steel brackets were used and were randomly divided into six groups of 20 each. Five methods of reconditioning were used in each of the first five groups while the last group was used as a control. The six groups (I-VI) were subjected to shear force for half an hour until the brackets debonded. SBS was measured and the methods showing the highest SBS were selected. Two groups were selected and then reconditioned for a second time using the previous steps. The SBS of all subgroups were examined with and without the application of a primer. For the clinical experiment, a total of 60-patients were selected from the waiting list of the orthodontic clinic of the Faculty of Dentistry, UNIVERSITY TEKNOLOGI MARA, Malaysia. The patients were randomly divided into three main groups of 20-patients each. 60-sets of 3M Unitek™ Gemini Brackets were used. The first group was reconditioned using 50µm aluminium oxide particle grit-blasting before bonding, the second group was reconditioned

using the Er,Cr3+:YSGG laser and the last was used as a control group. After polymerization, a .014 NiTi archwire was inserted within half an hour. Monthly follow up of all the patients were carried out for one year. The brackets' bond failure rate was recorded and calculated by percentage of failure. The results were subjected to statistical analysis to identify differences in SBS and bond failure rate. ANOVA and Tukey's post hoc test were used to identify the differences. **Results:** There was a significant difference between the mean SBS of the Er, Cr3+:YSGG laser, grit-blasting and control groups and the means of the SBS of each of the other three methods. There was, however, no significant difference between the mean SBS of the new bracket and the mean SBS of reconditioned brackets using Er, Cr3+:YSGG laser or grit-blasting. The mean SBS of all sub-groups were higher than the recommended range. Brackets with primer showed slightly higher SBS compared to those of brackets without a bonding agent. The ARI scores (0 and 1) were more in the groups with higher SBS, and scores (2 and 3) were more in the groups with lower SBS. Clinically, there was no significant difference between the percentage of bond failure rate of the new brackets and that of the reconditioned groups ($p > 0.05$). **Conclusions:** Reconditioned orthodontic brackets using grit-blasting and Er,Cr3+:YSGG laser can be used following bond failure as an alternative to new brackets.