ABSTRACT

Aim: This study has compared the Shear Bond Strengths (SBSs) of ceramic brackets and metal brackets.

Materials and Method: Forty freshly extracted, human maxillary first premolars were selected for bonding. They were equally bonded with ceramic brackets (Transcend series 6000) and metal brackets (Mini Dynalock Straight wire brackets). A no – mix orthodontic adhesive system was used. Their shear bond strengths were measured by using the Instron universal machine.

Results: The mean bond strength of the ceramic brackets was 20.68 ± 3.89 Mpa and that of the metal brackets was 12.15 ± 1.32 MPa.

Conclusion: The shear bond strength of the ceramic brackets was found to be superior than that of the metal brackets.

Key words: Bracket, Ceramic, Metal, Shear bond

INTRODUCTION

Aesthetic orthodontic appliances have been in demand for adult patients in the recent years [1]. Ceramic orthodontics brackets were introduced in 1987 as a more aesthetically pleasing alternative to the stainless steel brackets [2]. Two types of ceramic brackets are currently available in the market, polycrystalline and monocry stalline (single-crystal) aluminas [3,4]. Ceramic brackets are also quite strong; they are more difficult to deform and have a higher tensile strength than the stainless steel brackets [5]. The bonding strength of ceramic brackets has been shown to be significantly higher than that of metal brackets. The high bond strength results from silanization of the bracket base, mechanical retention, or both [6,7]. The silane coupling agents have been reported to enhance the bond strength to the porcelain surfaces [8,9]. The silane reacts with the silica within the porcelain and the organic groups of the bonding resin, thus forming a bridge between the two materials [10]. In fact, orthodontists sometimes experience problems during debonding, when the bond is too strong to break [11].

The purpose of this study was to compare the shear bond strength of ceramic brackets and that of stainless steel brackets.

MATERIALS AND METHODS

Forty freshly extracted maxillary first premolars (they were extracted for therapeutic reasons), which were non carious without any cracks and were not fractured, were selected for this study. All the collected teeth were cleaned of blood and saliva and they were stored in a buffered saline solution at room temperature. They were divided into 2 groups of 20 teeth each. In Group A – Ceramic (Transcend series 6000, 3M Unitek) brackets were bonded and in Group B – Stainless steel (Mini Dynalock straight wire metal brackets, 3M Unitek) brackets were bonded [Table/Fig-1].

The bonding procedure: All the extracted teeth were cleaned with a scaler and then with a fine pumice by using a rubber prophylaxis cup on a slow speed conventional hand piece (2000 – 5000 rpm). A 37% phosphoric acid solution was applied to each enamel surface with a disposable foam pellet for 30 seconds. The teeth were then rinsed with a stream of water for 20 seconds and dried with oil free compressed air for 15 seconds.

A no-mix orthodontic adhesive system was used. The teeth were left at room temperature for 30 minutes to allow full polymerization of the adhesive (chemically activated resin) and they were then stored at room temperature in saline to prevent dehydration before they were tested. Each tooth was held in a mounting jig [Table/Fig-2]. An Instron universal machine was used to perform the debonding tests [Table/Fig-3]. The shear stress at the bond failure was recorded for each bracket and the bond strength was calculated. The statistical analysis of the findings was done and the standard deviation and mean were calculated. The Student’s ‘t’ test was used to compare the mean bond strengths of the two groups.
DISCUSSION

Aesthetic considerations are of key importance for the patients who undergo orthodontic treatment. Aesthetic orthodontic brackets have been developed to meet this demand of the patients. However, at the same time, other material properties such as the bond strength, the structural integrity, the bonding mechanism etc., have to be considered, in order to meet the clinical requirements.

Metal brackets, though they are aesthetically inferior to ceramic brackets, can be deformed considerably without fracturing, even in the presence of impurities and at sharp intersections [12]. They...
CONCLUSION

The Transcend 6000 series brackets are aesthetically superior and they provide a greater bond strength as compared to the metallic brackets.

REFERENCES


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