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Original Research

Elastic vs stainless steel ligation in root canal treated teeth- An in vivo study

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ABSTRACT

Background: Orthodontic ligatures have an important role during edgewise bracket sliding along a continuous arch wire. The present study was conducted to compare elastic ligation vs stainless steel ligation in root canal treated teeth. **Materials & Methods:** The present study was conducted on 90 patients requiring orthodontic treatment of both genders. Patients were randomly divided into 2 groups of 45 each. In group I patients, elastic ligation was used and in group II patients, stainless steel ligation was used. In both groups, bleeding index and probing periodontal depth was measured. **Results:** The mean probing periodontal depth in group I was 1.8 and in group II was 1.4. The difference was non- significant (P> 0.05). The mean bleeding score in group I was 2.4 and in group II was 2.6. The difference was non-significant (P> 0.05). **Conclusion:** Authors found both elastic and stainless steel ligation equally effective. There was non- significant effect on bleeding score and probing periodontal depth.

Key words: Elastic, Stainless steel, ligation.

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INTRODUCTION

The vast majority of fixed orthodontic appliances have stored tooth-moving forces in archwire, which are deformed within their elastic limit. For this force to be transmitted to a tooth, wires need a form of connection to the bracket. Stainless steel alloy wires of varying gauge (.009 to.014 inch) are used. Tips are twisted together to ensure firmness. Twisted end is folded back under the archwire.[1]

Orthodontic ligatures have an important role during edgewise bracket sliding along a continuous archwire, the function of constituting the connection between the bracket and orthodontic archwire. There are two types of orthodontic ligatures: heat-treated stainless steel and elastomeric rings. The former are modelled from a steel wire of a diameter between 0.008 and 0.014 inches. They ensure a sufficiently rigid and stable ligation between orthodontic bracket and archwire, though favouring the development of significant friction levels during mechanical sliding.[2]

The number of factors have been implicated in influencing friction which include kinematics of the surfaces in contact (the direction and magnitude of the relative motion between the surfaces in contact), externally applied loads and/or displacements (including orthodontic ligation), environmental conditions such as temperature and lubricants, surface topography, and material properties. The method of arch wire ligation is an important factor contributing to the frictional forces generated.[3] The present study was conducted to compare elastic ligation vs stainless steel ligation in root canal treated teeth.

MATERIALS & METHODS

The present study was conducted in the department of Orthodontics. It comprised of 90 patients requiring orthodontic treatment of both genders. Ethical approval was obtained prior to the study. All patients were informed and written consent was obtained.

Data such as name, age, gender etc was recorded. Patients were randomly divided into 2 groups of 45 each. In group I patients, elastic ligation was used and in group II patients, stainless steel ligation was used. Teeth in which ligation was used was root canal treated as per guidelines. In both groups, bleeding index and probing periodontal depth was measured. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Graph I Distribution of patients

Groups	Group I (Elastic ligation)	Group II (Stainless steel ligation)
Number	45	45

Table I shows that in group I patients, elastic ligation was used and in group II patients, stainless steel ligation was used.

Table II Comparison of probing periodontal depth in both groups

Groups	Group I	Group II	P value
Mean	1.8	1.4	0.81

Table II, graph I shows that mean probing periodontal depth in group I was 1.8 and in group II was 1.4. The difference was non- significant (P> 0.05).

Graph I: Comparison of probing periodontal depth in both groups

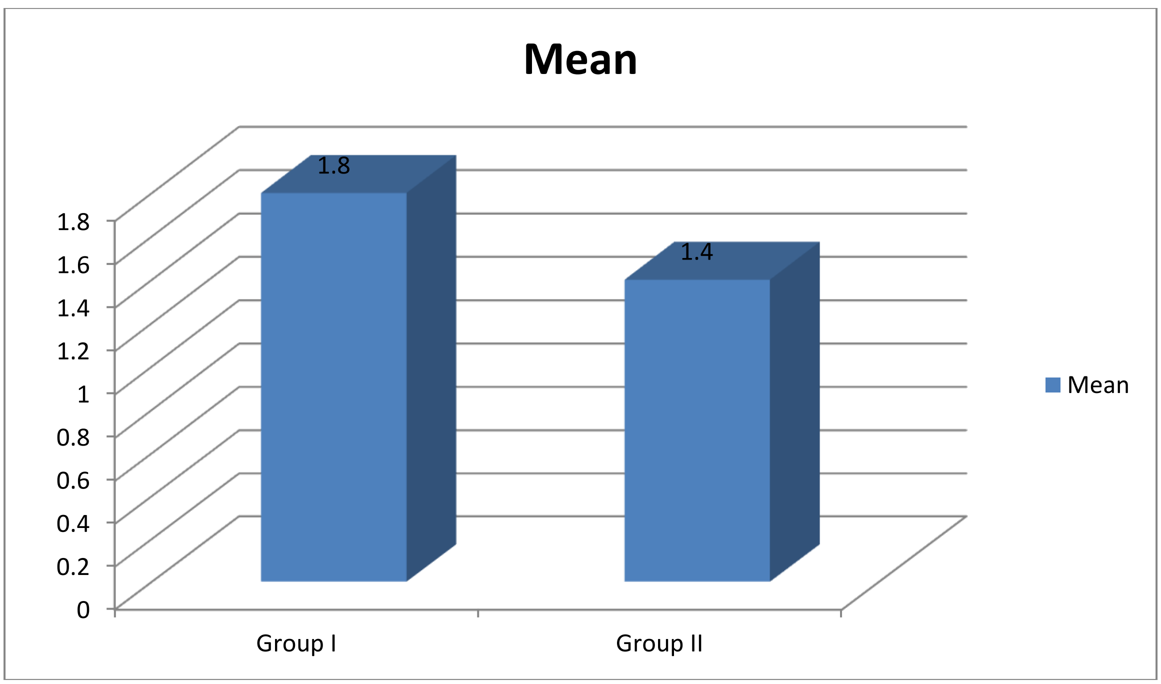
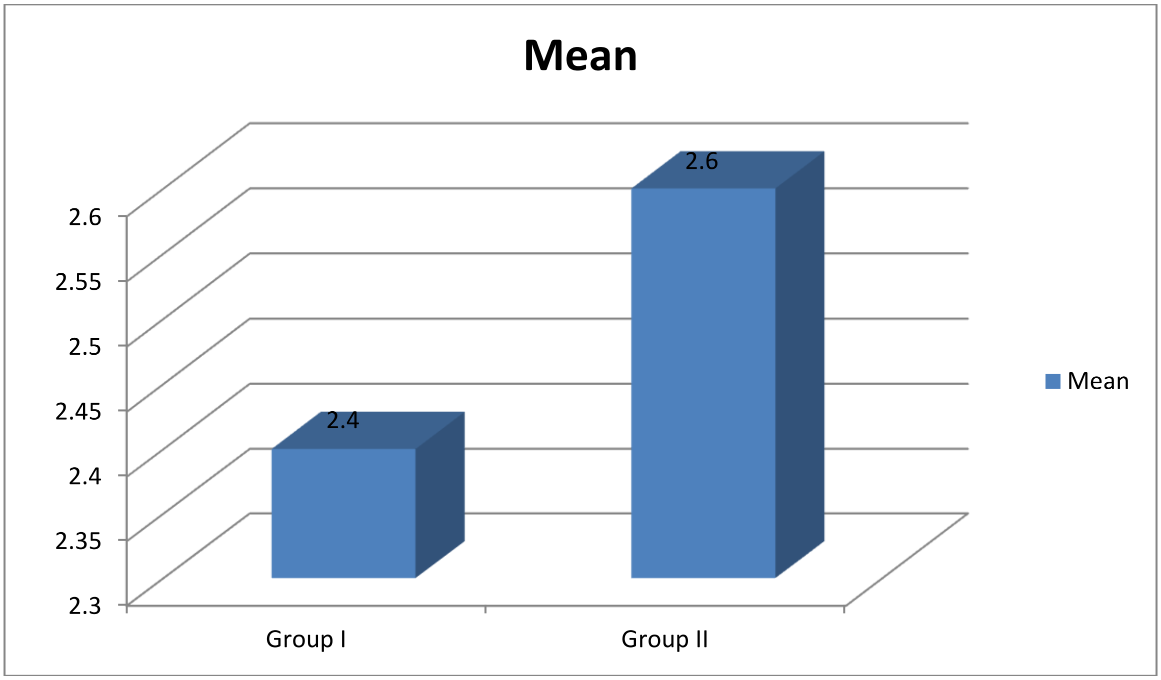


Table III Comparison of bleeding index in both groups

Groups	Group I	Group II	P value
Mean	2.4	2.6	0.91

Table II, graph I shows that mean bleeding score in group I was 2.4 and in group II was 2.6. The difference was non-significant (P> 0.05).

Graph I: Comparison of bleeding index in both groups



DISCUSSION

Each manufacturer produces modules of differing dimensions. Moisture and heat decrease the force levels and dimensional stability of elastomeric materials. The greater the wall thickness and the smaller the inside diameter, the greater the force the elastomeric ligature produces. However the outside diameter is poorly linked with the forces generated.[4] It would be helpful if the modules were all marketed according to the inside diameter as this is most clinically useful It had been proposed that small and medium elastomeric ligatures produce a significant decrease (13 to 17%) in frictional forces when compared with large ligatures, and this can be ascribed mainly to the wall thickness. A more recent study contradicts this finding; they found no statistically significant difference in the friction generated by ligatures of different sizes.[5]

Orthodontic metal brackets are made of materials with high corrosion resistance. However, they can be corroded in the oral cavity while under conditions of low pH, the presence of dental plaque, and a high chloride ion concentration. The pH of the environment in which orthodontic brackets are used has a significant effect on the rate of corrosion.[6]

Ligatures commonly used in orthodontics are either heat treated stainless-steel or elastomeric rings. Elastomeric products have been in use in orthodontics since 1960's as ligatures, continuous chains, etc. Technologically, this is one area that has undergone various studies to prove their existence in the field of orthodontics. These studies have increased the acceptance of these materials in clinical orthodontics.[7] The present study was conducted to compare elastic ligation vs stainless steel ligation in root canal treated teeth.

In present study, in group I patients, elastic ligation was used and in group II patients, stainless steel ligation was used. Vaughan et al[8] demonstrated that sintered stainless steel brackets generated 40% less friction than elastic brackets. Sintering allows compression of stainless steel particles into a smooth contoured shape, unlike the casting process which requires milling, creating sharp angular brackets.

We found that mean probing periodontal depth in group I was 1.8 and in group II was 1.4. The mean bleeding score in group I was 2.4 and in group II was 2.6. In an attempt to eliminate the effects of elastomeric and stainless steel ligatures, self-ligating brackets were introduced, which have been shown to generate very low frictional forces. Self-ligating brackets are more expensive than conventional brackets but this is counterbalanced by advantages such as reductions in chairside time, treatment duration and the absence of biohostable elastic modules.[9]

Clocheret et al[10] found that the problem related to the corrosion of an orthodontic bracket is its frictional behaviour, which can wear the contact surface by relative motion of the two materials. As is generally known in the corrosion–wear phenomenon, oxides formed by a chemical reaction on a surface can increase the frictional force. For this reason, if a metal with good corrosion resistance is used, it may decrease the frictional force between the two metal surfaces and help reduce the total treatment period, by inducing more precise tooth movements.

CONCLUSION

Authors found both elastic and stainless steel ligation equally effective. There was non- significant effect on bleeding score and probing periodontal depth.

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