



**“EFFECT OF FERRULE ON THE FRACTURE RESISTANCE OF TEETH
RESTORED WITH PARAPOST XP AND PARAPOST FIBER LUX UNDER
TANGENTIAL LOAD-AN IN VITRO STUDY ”**

By

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ABSTRACT

Introduction:

Endodontically treated teeth are at higher risk of fracture than vital teeth due to the decreased moisture content in dentin and most of the times, compromised structural integrity. For functional and esthetic concerns, complete coverage crown restorations along with post and core is often recommended to enhance retention of crowns. The cast post and core technique has been advocated as the gold standard restoration for decades, but the traditional technique is time consuming and involves great laboratory and material costs. Introduction of prefabricated metallic post systems and esthetic post systems such as fibre-reinforced and zirconia ceramic posts have improved the results significantly.

A ferrule is a metal ring or cap intended for strengthening. The word probably originates from combining the Latin for iron (ferrum) and bracelets (viriola) (Brown 1993). A dental ferrule is an encircling band of cast metal around the coronal surface of the tooth. The availability of 2.0 mm of coronal tooth structure between the shoulder of the crown preparation and the tooth/core junction has been shown to provide a ferrule effect enhancing fracture resistance and preventing fracture and dislodgement of the post. It has been stated the ferrule can improve resistance to dynamic occlusal loading, maintain the integrity of the cement seal of the artificial crown retainer, and reduce the potential for concentration of stress at the junction of the post and core. Furthermore, "the ferrule effect" reduces the wedging of tapered posts or bending forces during post-insertion and helps to improve the marginal integrity of fixed partial dentures.

Objective:

- 1] To assess the effect of ferrule on the fracture resistance of teeth restored with Parapost XP under tangential load.
- 2] To assess the effect of ferrule on the fracture resistance of teeth restored with Parapost Fiber Lux under tangential load.
- 3] To compare the fracture resistance of teeth restored with Parapost XP and Parapost Fiber Lux under tangential load.

Methodology:

Forty Human maxillary central incisors extracted within three months will be stored in saline solution. Coronal sections of teeth to be restored will be sectioned with carborundum discs 2mm occlusal to cemento-enamel junction. Forty maxillary central incisors specimen collected will be divided into two groups.

Group 1 includes 20 central incisors without ferrule and will be further divided into two subgroups, 'a' with Parapost XP and 'b' with Parapost Fiber Lux.

Group 2 includes 20 central incisors with 2mm ferrule and will be further divided into two subgroups, 'a' with Parapost XP and 'b' with Parapost Fiber Lux.

Coronal sections of teeth to be restored will be sectioned with carborundum discs 2mm occlusal to cemento-enamel junction. The teeth will be then endodontically instrumented and root canals will be obturated using gutta percha.

After root canal treatment, teeth will be prepared for post space to $\frac{2}{3}$ rd of root length by means of preparation drills. Then the posts will be cleaned with alcohol and dried with air free water and oil. Self adhesive resin cement and fiber post will be inserted into post space. After removal of excess cement, resin cement will be allowed for 5 minutes to polymerise. Remaining posts will be cemented with glass ionomer luting

cement. After posts cementation, core portion will be built up using core build material, followed by full coverage crowns.

To simulate the periodontal ligament, first, 200 μ thickness Bausch articulating paper will be stuck to the root surface of restored tooth and the assembly will be placed in to a small container into which modelling wax was poured. The articulating paper will be coated with a thin layer of petroleum jelly before pouring the liquid wax, which will help in easy removal of tooth after wax sets and this set wax acts a mould.

Once the wax will set, tooth will be removed from wax mould and articulating paper will be scraped off. The space created by articulating paper will be replaced by polyvinyl siloxane impression material. Finally , all the specimens will be embedded in the acrylic resin block to a depth of 2mm below the cemento-enamel junction.

The mounted specimens will be secured in a universal testing machine and a force will be applied at a crosshead speed of 1mm/min until fracture occurred. The fracture load will be recorded in Newtons

Results : When tangential loads were applied to the samples, it was seen that the teeth restored with posts having ferrule withstood higher amounts of force before fracture when compared to those without ferrule.

Conclusion : Within the limitation of the present study , it can be concluded that the ferrule effect plays a key role in increasing the fracture resistance of teeth restored with post and core.

Keywords : Parapost XP, Parapost Fiber Lux, Cemento-enamel junction, Self adhesive resin cement.