

## **Introduction**

A correct diagnosis, access opening, chemo-mechanical preparation and seal of the root canal space with a core material and a root canal sealer to achieve disinfection as well as a hermetic seal is essential for the success of endodontic treatment. For years gutta-percha has been the core material for sealing the root canal space along with a sealer. One of the main drawbacks of this material was that it did not adhere to the root canal wall. In 2004, Resilon, a resin based obturating material was introduced in the market which along with methacrylate based sealers like Epiphany, RealSeal and RealSeal SE created the “monoblock” concept.

Chemical irrigants like sodium hypochlorite adversely affect the adhesion of these resin based obturating materials to the root canal dentin as a result of residual oxygen generated. The use of antioxidants like ascorbic acid, tannic acid, gallic acid on sodium hypochlorite treated dentin can, not only reverse bond strength but also increase the dentinal tubular penetration of the sealer ensuring better seal.

## **Aims And Objectives**

To observe the effect of antioxidants 10% ascorbic acid, 10% tannic acid and 10% gallic acid on the dentinal tubular penetration of Resilon and RealSeal SE on sodium hypochlorite treated root canal dentin .

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## **Methodology**

Fifty non carious, single rooted mandibular premolars freshly extracted for orthodontic purposes were collected. The teeth were decoronated to achieve 14 mm. root length and divided into five groups of ten teeth each. Initial apical file was no. 10 K file. Biomechanical preparation of the teeth were done with HERO Shaper Ni-Ti rotary instruments. Irrigation of group I was done with saline and 17% ethylenediaminetetraacetic acid. Groups II, III, IV and V were irrigated with 5.25% sodium hypochlorite and 17% ethylenediaminetetraacetic acid. Additional irrigation of the root canals of groups III, IV and V were done with the antioxidants 10% ascorbic acid, 10% tannic acid and 10% gallic acid respectively. The teeth in all the groups were obturated with Resilon and RealSeal SE. Longitudinal sectioning of the samples were done after 24 hours. This was followed by dehydration in alcohol. The specimens were then gold sputtered and analysed by scanning electron microscopy. The tubular penetration of the sealer was evaluated by observing the maximum tubular penetration in micrometers at the cervical, middle and apical third of each specimen in every group. Statistical analysis was done using computer software SPSS (16.0) version. The data was expressed in it's mean and standard deviation.

## **Results and Observations**

Group I (negative control) showed intermediate penetration of the sealer at cervical, middle and apical third. Group II (positive control) had the least penetration of the sealer at cervical, middle and apical third. All the groups irrigated with antioxidants showed good penetration of the sealer at the cervical, middle and apical

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third. The group in which irrigation was done with gallic acid showed maximum penetration at all the three levels.

## **Conclusion**

In the present study it is well demonstrated that application of antioxidants in sodium hypochlorite treated root canal dentin increased the dentinal tubular penetration of Resilon and RealSeal SE in the cervical, middle and apical third. The use of gallic acid as an antioxidant showed the maximum tubular penetration at all the three levels.

## **Clinical Significance**

The adhesiveness of resin based obturating materials Resilon and RealSeal SE to root canal dentin is adversely affected by the irrigants like sodium hypochlorite as a result of residual oxygen. Antioxidants with its radical scavenging activity can reverse the effect of sodium hypochlorite on root dentin thus enabling better dentinal tubular penetration of the sealer and better seal of the root canal space.

## **Key words**

Hermetic seal, monoblock effect, sodium hypochlorite, dentinal tubular penetration, antioxidants oxidation-reduction reactions.

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