Evaluation Of Apical Extrusion And CBCT Assessment Of Irrigant Penetration

The chemomechanical debridement of the root canal has a major contribution towards the success of endodontic treatment. Not just the shaping of canal using instrumentation, irrigation also plays a prime role in eliminating pulp tissues, microbiota and their by-products, and organic and inorganic debris.

Irrigants like sodium hypochlorite (NaOCl) along with Ethylene Diamine Tetraacetic Acid (EDTA) are commonly used to achieve the goal of chemical debridement. However, the periapical extrusion of Sodium Hypochlorite can have adverse effects like severe pain, edema, profuse haemorrhage, and ecchymosis accompanied by tissue necrosis and paresthesia.

Also, the apical root canal imposes a special challenge to irrigation as the balance between safety and effectiveness is particularly important in this area(3). Thus, to successfully achieve the goal of endodontic therapy, an effective irrigation technique should be followed which facilitates the penetration of the irrigant solution to the apical third of the canals without forcing it into the periapical tissues.

Root canal irrigation can be done by different means of delivery, from traditional syringe-needle technique to various machine-driven systems, including sonic and ultrasonic energy.

The conventional syringe-needle irrigation is most widely used because of its ease to manipulate. In needle irrigation system, replenishment and exchange of irrigants in the apical third is difficult and thus the effectiveness of chemical debridement is dependent on the depth of needle insertion. There is a risk of forcing irrigants past the terminus of the root canal if too much positive pressure is used, resulting in severe tissue damage and postoperative pain(4). Another disadvantage associated with this technique is the vapor lock that results in trapped air in the apical third of root canals which might also hinder the exchange of irrigants and hence can affect the debridement efficacy of irrigants.

EndoActivator (Advanced Endodontics, Santa Barbara CA) is one of the newer irrigation systems which is a sonically driven system that comprises a portable handpiece and three types of disposable polymer tips of different sizes that do not cut dentin. Several reports have concluded that this sonic device may facilitate irrigation, particularly in the difficult-to-reach areas of the canals, such as fins and isthmuses and in large lateral canals.

Recently, a new NiTi finishing instrument was developed with the purpose of improving root canal cleaning—the XP-Endo Finisher (FKG Dentaire, La Chaux-de-Fonds, Switzerland), which is a size 25 non-tapered instrument made with the NiTi MaxWire alloy (Martensite- Austenite ElectropolishFleX, FKG Dentaire). Because of this special alloy, this instrument is straight in its martensitic phase, at temperatures below 30°C; however, when placed in the root canal at body temperature, it changes to the austenitic phase in which the instrument assumes a spoon shape. This makes the instrument scrape the canal walls and cause turbulence of the irrigant solution.

In past literature, there is a paucity of studies which has cited the importance of penetration of irrigant in the apical third of the root canal, and simultaneously compared it to the safety of irrigation systems. However, this is an important criterion to justify the disinfection capacity of an irrigant activation technique.

Thus, the aim of this study is to evaluate apical extrusion and CBCT assessment of irrigant penetration using contemporary irrigation systems like EndoActivator and XP Endo Finisher.