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The effect of Qmix and sodium hypochlorite as root canal irrigants on root canal cleanliness using different irrigation Techniques.

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{ يرفع الله الذين آمنوا منكم
والذين أوتوا العلم درجات }

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Dedication

To My Parents

- My Father
- My Mother

To My Family

- My Husband
- My Twins Fares and Adam

To My Sisters

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LIST OF ABBREVIATIONS

SEM : Scanning electronmicroscope
NaOCl : Sodium hypochlorite
PS : Plastic syringe
US : Ultrasonic
PUI : Passive ultrasonic irrigation
EDTA : Ethylene diamine tetraacetic acid
EGTA : Ethylene glycol tetraacetic acid
H_2O_2 : Hydrogen peroxide
NiTi : Nickel titanium
MTAD : Mixture of tetracycline isomer, an acid and a detergant
CA : Citric acid
CHX : Chlrohexidine
EDS : Electron dispersive spectroscopy
CSL : Chemical smear layer
DW : Distilled water
TOF-SIMS : Time of flight secondary ion mass spectrometry
IP6 : Inositol hexakisphosphate
PC : Personal computer
TIFF : Tagged image file format
SACs : Simulated accessory canals
ANP : Apical negative pressure
WL : Working length

Introduction

The objectives of root canal therapy are cleaning, shaping, and obturating the root canal system in three dimensions, hence preventing re-infection, thereby creating an environment conductive to healing. The mechanical action of instruments alone is not sufficient to promote satisfactory cleaning of the root canal system. Hence the use of different chemical agents may help in cleaning the complex root canal system through chemical dissolution, detoxification, debridement and flushing away contents of the root canal space.

The requirements of an ideal root canal irrigant are providing lubrication for instrumentation, and it would flush debris from the canal during mechanical preparation and dissolve organic tissue in inaccessible areas of the root canal. It should be bactericidal yet have minimal cytotoxicity, also an irrigant should aid in removal of the smear layer. Several irrigating solutions have been suggested and used however, Sodium hypochlorite is considered the most widely used irrigant in today's modern endodontic practice.

Qmix a root canal irrigant that is composed of Ethylene diamine tetracacetic acid, disodium dehydrate (EDTA) and Chlorhexidine Digluconate was developed to be used as irrigant combining germicidal and calcium chelator's actions. Different irrigation techniques as plastic syringe, manual agitation and passive ultrasonic irrigation affect the efficiency and performance of the irrigating solution, therefore conducting a study to assess the efficiency of Qmix in comparison to sodium hypochlorite as endodontic irrigating solutions using different irrigation techniques was thought to be of great value.

Review of literature

There is a common consensus that root canal irrigants are indispensible aids in dissolving and inactivating organic debris and destroying micro organisms. In addition some agents allow removal of a post preparation smear layer in order to allow access to dentinal tubules. Several methods of employment of an irrigant inside the canal space are available. (1)

Root canal cleanliness is achieved by the action of different irrigating solutions and irrigation techniques. During cleaning and shaping organic pulpal materials and inorganic dentinal debris accumulate on the radicular canal wall producing an amorphous irregular smear layer. With pulp necrosis the smear layer can be contaminated by bacteria and their metabolic by-products. The smear layer is superficial with a thickness of 1-5 micrometers and debris can be packed into the dentinal tubules in varying distances. (2)

The advantages and disadvantages of the presence of smear layer, and whether it should be removed or not from the instrumented root canals, are still controversial. Endodontic smear layer delays the action of endodontic disinfectants and acts as a physical barrier interfering with adhesion and penetration of sealers into dentinal tubules. In turn, it may affect the sealing efficiency of root canal obturation.(3)