

BOND STRENGTH OF GUTTA PERCHA ROOT CANAL FILLING TO DENTIN AFTER DIFFERENT IRRIGATION PROTOCOLS

Thesis

Submitted to Endodontic department

Faculty of dentistry, Ain Shams University

In partial fulfillment of the requirements of

Master degree in Endodontics

By

Samah Ahmed Abd el Aziz

(B.D.S)

Faculty of Dentistry Ain Shams University

(2002)

2013

Supervised by

**Prof. Ahmed Abdel Rahman
Hashem**

Professor of Endodontics,
Faculty of Dentistry, Ain Shams University

Dr. Maram Farouk Obeid

Lecturer of Endodontics
Faculty of Dentistry, Ain Shams University

تحت اشراف

أ.د/ أحمد عبدالرحمن هاشم

أستاذ علاج الجذور

كلية طب الأسنان

جامعة عين شمس

د/ مرام فاروق عبيد

مدرس علاج الجذور

كلية طب الأسنان

جامعة عين شمس

2013

قياس قوة الرابطة بين مادة الجتا بركا لحشو الجذور وعاج الأسنان بعد استخدام محاليل مختلفة لغسيل قنوات الجذور

رسالة

لكلية طب الأسنان جامعة عين شمس للحصول
على درجة الماجستير في علاج الجذور

مقدمة من الطبيبه

سماح أحمد عبدالعزيز

بكالوريوس طب وجراحة الفم والأسنان

جامعة عين شمس

{ قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ }

صدق الله العظيم

سورة البقرة

اية 32

ACKNOWLEDGEMENT

First of all thanks and praise to *Allah*, who gives me everything, enable me to complete this work.

I am extremely fortunate to have the opportunity to work under the kind guidance of ***Prof. Ahmed Abdel Rahman Hashem***, *Prof of Endodontics, Faculty of Dentistry–Ain Shams University*. I am greatly honored to express my deepest thanks for his indispensable support.

I was lucky to work under supervision of ***Dr. Maram Obeid***, *Lecturer of Endodontics, Faculty of Dentistry – Ain Shams University*, who helped me a lot during my study; I would like to express my deepest appreciation for her support.

I would like to thank my family
who gave me unconditional
encouragement and support
(thanks my beloved husband &
children). I would like to
dedicate my work to my
beloved father & mother.

CONTENT

	Page
Introduction	1
Review of Literature.....	4
Effect of different irrigants on bond strength	4
Bonding of epoxy based resin to dentin	45
Aim of the study	55
Materials and methods.....	56
Results.....	72
Discussion.....	97
Conclusion Summary	104
References.....	107
Arabic summary.....	1

LIST OF TABLES

TABLE	NAME	P
1	Classification of the Samples	60
2	Descriptive Data	73
3	Means, standard deviation (SD), values (in MPa), and results of comparison between push-out bond strength of the six groups at the coronal segment	74
4	Means, standard deviation (SD), values (in MPa), and results of comparison between push-out bond strength of the six groups at the middle segment	76
5	Means, standard deviation (SD), values (in MPa), and results of comparison between push-out bond strength of the six groups at the apical segment	78
6	Means, standard deviation (SD), values (in MPa), and results of comparison between push-out bond strength at the three segments of NaOCl group	79
7	Means, standard deviation (SD), values (in MPa), and results of comparison between push-out bond strength at the three segments of EDTA group	81
8	Means, standard deviation (SD), values (in MPa), and results of comparison between push-out bond strength at the three segments of EDTA + CHX group	82

9	Means, standard deviation (SD) values (in MPa), and results of comparison between push-out bond strength at the three segments of MTAD group	84
10	Means, standard deviation (SD), values (in MPa), and results of comparison between push-out bond strength at the three segments of MTAD + CHX group	85
11	Means, standard deviation (SD), values (in MPa), and results of comparison between push-out bond strength at the three segments of CHX group	86
12	Distribution of failure modes found in the cervical, middle and apical thirds of each group after the push-out test	88
13	Percentage of mode of failure found in each group after the push-out test	89

LIST OF FIGURES

FIGURE	NAME	P
1	Coronal, middle, and apical root sections were cut after setting of the acrylic resin	66
2	The loading fixture	66
3	Schematic diagram for the loading fixture used in the push-out test	67
4	Different plungers used in the push out test	68
5	Loading of the tested sample using Instron testing machine	69
6	Bar chart representing the overall mean push-out bond strength of the six groups	75
7	Bar chart representing mean push-out bond strength of the six groups at the coronal segment	76
8	Bar chart representing mean push-out bond strength of the six groups at the middle segment	78
9	Bar chart representing mean push-out bond strength of the six groups at the apical segment	80

10	Bar chart representing mean push-out bond strength at the three segments of NaOCl group.	81
11	Bar chart representing mean push-out bond strength at the three segments of EDTA group	82
12	Bar chart representing mean push-out bond strength at the three segments of EDTA + CHX group	83
13	Bar chart representing mean push-out bond strength at the three segments of MTAD group	84
14	Bar chart representing mean push-out bond strength at the three segments of MTAD + CHX group	86
15	Bar chart representing mean push-out bond strength at the three segments of CHX group	88
16	Scanning electron microscope showing the mixed mode of failure; in NaOCl group	90
17	SEM showing mixed mode of failure; in NaOCl group	90
18	SEM showing mixed mode of failure; in the EDTA group, where the surfaces of dentin were partially covered by sealer or gutta-percha after the push-out test	91

19	SEM showing mixed mode of failure; in the EDTA group, where the surfaces of dentin were partially covered by sealer or gutta-percha after the push-out test	91
20	SEM showing mixed mode of failure; in the EDTA+CHX group	92
21	SEM showing adhesive mode of failure; in the EDTA+CHX group	92
22	SEM showing mixed mode of failure; in the EDTA+CHX group	93
23	Scanning electron micrograph showing the mixed mode of failure in MTAD group	93
24	Scanning electron micrograph showing the mixed mode of failure in MTAD group	94
25	SEM showing mixed mode of failure; in the MTAD+CHX group	94
26	SEM showing mixed mode of failure; in the MTAD+CHX group	95
27	SEM showing mixed mode of failure; in the CHX group	95
28	SEM showing mixed mode of failure; in the CHX group	95

The main objectives of root canal therapy; are removal of diseased tissue, elimination of microorganisms present in the canals and prevention of recontamination after treatment. Current techniques of root canal debridement leave many areas of the root canal system completely untouched by instruments. Thus, a root canal irrigant is needed to aid in debridement .

Studies show that currently used methods of instrumentation especially, Rotary; produce smear layer that covers root canal walls and obliterate the openings of the dentinal tubules. The smear layer consists of organic and inorganic substances, including fragments of odontoblastic processes, microorganisms and necrotic materials. This layer prevents penetration of intracanal medications and also prevents complete adaptation of obturation materials to the prepared root canal surfaces. Various organic acids, ultrasonic instruments, and lasers have been used to remove the smear layer .

In the last years various irrigant materials were introduced to be used in the procedure of root canal cleaning either alone or in combination and they were evaluated according to their cleaning ability, antimicrobial effect, their penetration, lubrication and their ability to remove the smear layer . The effect of irrigants in root canal biomechanical preparation is

not only limited to their effect on pulp tissue and microorganisms but it also extends to the chemical composition of dentin surface so it affects the bond strength between dentin and different obturating materials .

Sodium hypochlorite (NaOCl) is still widely used in different concentrations due to its effective antimicrobial action, dissolution of organic material, transformation of amines into chloramines as well as its deodorizing effects and ease of removal from the canal. At high concentrations it is toxic and irritant to the tissues .

Chlorhexidine (CHX) is an effective oral antimicrobial agent. It shows a broad-spectrum antimicrobial effect, substantivity and low toxicity but it doesn't dissolve organic material. Its effect is comparable to NaOCl . Ethylene diamine tetra acetic acid (EDTA) is a chelating agent used for removal of the inorganic part of smear layer, different studies have shown that EDTA can remove the smear layer and result in dentinal tubules opening . Citric acid is used for removal of the inorganic part of smear layer and also results in dentinal tubules opening. MTAD is a new irrigating solution; a mixture of tetracycline isomer, an acid, and a detergent which is capable of safely removing the smear layer and effectively eliminating *Enterococcus faecalis* .