IMPACT OF CONVENTIONAL AND TRUSS ACCESS CAVITY PREPARATION AND DIFFERENT CORE FILLING MATERIALS ON FRACTURE STRENGTH OF ENDODONTICALLY TREATED TEETH: A CBCT ASSISTED IN VITRO STUDY

By

Dr. S. MANEESH AHAMED

Dissertation Submitted to the

Kerala University of Health Sciences, Thrissur, Kerala.

In partial fulfilment of the requirements for the degree of

Master of Dental Surgery

In

Branch IV - Conservative Dentistry & Endodontics

Under the guidance of

Prof. Dr. JAIN MATHEW

Dept. of Conservative Dentistry & Endodontics

St. Gregorios Dental College

Chelad, Kothamangalam

2018-2021

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled "Impact of Conventional and Truss Access Cavity Preparation and Different Core Filling Materials on Fracture Strength of Endodontically Treated Teeth: A CBCT Assisted In Vitro Study" is a bonafide and genuine research work carried out by me under the guidance of Prof. Dr. Jain Mathew, Department of Conservative Dentistry & Endodontics, St. Gregorios Dental College, Chelad, Kothamangalam.

Date: Signature of candidate:

Kothamangalam

Dr. S. Maneesh Ahamed

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled "Impact of Conventional and Truss Access Cavity Preparation and Different Core Filling Materials on Fracture Strength of Endodontically Treated Teeth: A CBCT Assisted In Vitro Study" is a bonafide research work done by Dr. S. Maneesh Ahamed, in partial fulfilment of the requirement for the degree of Master of Dental Surgery.

Date: Signature of the Guide:

Kothamangalam

Prof. Dr. Jain Mathew
Principal, HOD, Guide
Dept. of Conservative Dentistry & Endodontics

ENDORSEMENT BY THE HOD, PRINCIPAL / HEAD OF THE INSTITUTION

This is to certify that the dissertation entitled "Impact of Conventional and Truss Access Cavity Preparation and Different Core Filling Materials on Fracture Strength of Endodontically Treated Teeth: A CBCT Assisted In Vitro Study" is a bonafide research work done by Dr. S. Maneesh Ahamed under the guidance of Prof. Dr. Jain Mathew, Department of Conservative Dentistry & Endodontics, St. Gregorios Dental College, Chelad, Kothamangalam.

Seal & Signature of HOD
Prof. Dr. Jain Mathew
Date:
Kothamangalam

Seal & Signature of Principal
Prof. Dr. Jain Mathew
Date:
Kothamangalam

COPYRIGHT

Declaration by the Candidate

I hereby declare that the Kerala University of Health Sciences, Kerala shall have the right to preserve, use and disseminate this dissertation in print or electronic format for academic/ research purposes.

Date: Dr. S. Maneesh Ahamed

Kothamangalam

ACKNOWLEDGEMENT

I am most thankful to **Dr. Jain Mathew**, Principal. HOD and Guide. I have been amazingly fortunate to have him as my guide; he gave me the freedom to explore on my own and at the same time provided the guidance to recover when my steps faltered. His insightful comments and constructive criticisms at different stages of my research were thought-provoking and helped me focus on my ideas. I take this opportunity to express my extreme gratefulness for providing valuable insights and guiding me in my endeavour.

I am grateful to **Dr. Robin Theruvil**, Professor, for his constant encouragement and innovative ideas. He has always shown keen interest in the preparation of this dissertation. He has a great impact on me and has inspired me in the way I look at things. His patience and support helped me overcome many crisis situations and complete this dissertation. I thank him for his encouragement and supervision for the successful completion of this dissertation.

I am very thankful to **Dr. Saira George**, Professor, for her exceptional exemplification, logical reasoning and unambiguous ways of expression. She gave me sound advice, good teaching and good ideas. I am deeply grateful to her for the long discussions that helped me sort out the details of my work. I am grateful to her for carefully reading and commenting on countless revisions of this manuscript.

It is difficult to overstate my sincere gratitude to **Dr. Midhun Paul**, Reader, who with his enthusiasm, inspiration and great efforts to explain things clearly, has truly enriched me. He helped and encouraged me a lot throughout my postgraduate course.

It gives me great pleasure to express my deep sense of gratitude to **Dr. Allu Baby**, Senior Lecturer, for her honest dedication towards our education and career and for being with us in various levels of academic pursuits. She helped me to give my best in clinics and all through my work.

I appreciate the sincere efforts of **Dr. John Jacob**, Senior Lecturer, in providing me his valuable support, guidance and for listening with patience on almost everything. He has not only helped me in this dissertation but all throughout my postgraduate course.

I am very grateful to **Mr. Raveendran**, who helped me in conducting the research at Department of Polymer Science & Rubber Technology, CUSAT. I sincerely appreciate the efforts of **Mrs. Premi Sunny** who helped me immensely in the statistical analysis of the data collected for the study.

I remain deeply indebted to my parents, **Mr. Rafeeq Ahamed** and **Mrs. Laila Rafeeq** for their unconditional love, compassion and sacrifices. I thank them for their support and faith in me and for giving me the best of all opportunities. I am thankful to them for instilling in me the values and ethics and for moulding me into the person that I am today.

I thank my dear sister **Dr. Lasya Rafeeq** and my brother-in-law Mr. **Amar Sharukh** for their constant support and care.

I thank my fiancé **Naazlin Manaf** whose support and care helped me overcome setbacks and remain focused on my postgraduate study. I greatly value our relationship and I deeply appreciate her belief in me. I thank my parents-in-law **Mr. Abdul Manaf** and **Mrs. Fasliya Manaf** for their constant support and love.

I am very thankful to my colleague **Dr. Jesline Maria Jose** who has been a constant source of support and motivation. I thank her for being there for me as my 'friend in need'. I thank her for the priceless support, timely help and making a pleasant work environment.

I would like to thank my seniors **Dr. Asha Pius** and **Dr. Manju Krishna** for their guidance and constant support. I would also like to thank my juniors **Dr. Pooja Jayan, Dr. Jerrin Abraham George, Dr. Jimmy George, Dr. Ann Mariya Sunny** for their constant encouragement and support.

I would like to express my gratitude to all the non-teaching staff of our Department for their help in compiling this dissertation. I sincerely appreciate the contribution of all the people, who helped me to complete this study. I am indebted to them forever.

Place:

Date: **Dr. S. Maneesh Ahamed**

ABSTRACT

AIM

To evaluate and compare in vitro the fracture resistance of endodontically treated teeth with traditional access cavity and new conservative "Truss" access cavity, restored with different core filling materials, with and without coronal tooth material loss.

MATERIALS AND METHODS:

90 intact maxillary first premolars were selected for the study and were standardized based on anatomical measurements. It was then randomly divided in to 9 groups which consisted of one Control Group of intact molars and 8 test groups. CBCT scan was performed on all the samples. On the teeth in the test Groups 1, 2, 5 & 6, standardized Class II MOD cavities were prepared and in Groups 3, 4, 7 & 8, no Class II preparation was done. Conventional Access and Truss Access cavities were prepared on Groups 1, 2, 3, 4 and 5, 6, 7, 8 respectively, which was then followed by standard endodontic procedure. CBCT scan was used as a guide to prepare the Truss access. Before starting the core filling procedure, the mesial and distal walls of all teeth having Class II MOD cavity were restored using 3M ESPE Z250 XT Filtek-Nanohybrid direct composite. Teeth in Groups 1, 3, 5, and 8, were restored with GC Fuji IX glass ionomer cement according to the manufacturer's instructions. Group 2, 4, 6, and 8, were restored with light cured direct composite resin (Ivoclar Vivadent Tetric N) after acid etching and application of bonding agent. All teeth were mounted on acrylic blocks and subjected to fracture testing on Universal Testing Machine. Fractured samples were observed under stereomicroscope.

RESULTS: Fracture strength mean value in experimental groups was highest for Truss Access and least for Conventional access.

CONCLUSION: This study showed that Truss Access cavity preparation improved the fracture strength of endodontically treated teeth.

KEYWORDS: Conservative access cavity, Fracture strength, Mesio-occluso-distal cavity, Truss Access cavity.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF GRAPHS