بسم الله الرحمن الرحيم

∞∞∞

تم رفع هذه الرسالة بواسطة / سلوي محمود عقل

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

Load bearing capacity of inlay retained cantilever bridges with different preparation designs and materials

Thesis submitted to Faculty of dentistry, Ain Shams University, for partial fulfillment of the requirements of doctorate degree in fixed prosthodontics,

By

Rowaida Hassan Ali Hassan Naeem

B.D.S, Ain Shams University, 2011

M.Sc., Ain Shams University, 2017

Assistant Lecturer of fixed prosthodotics, Faculty of Dentistry,
Ain Shams University

Rowaida.naeem@dent.asu.edu.eg
01220323844

Faculty of dentistry,
Ain shams university
2022

Supervisors

Prof. Dr.Tarek Salah Morsi
Professor of fixed prosthodontics,
Faculty of dentistry,
Ain Shams University

Dr. Maged Mohamed Zohdy
Associate Professor of fixed prosthodontics,
Faculty of dentistry,
Ain Shams University

Dr. Doaa Taha Sayed Taha
Lecturer of fixed prosthodontics,
Faculty of dentistry,
Ain Shams University

Dedication

I wish to dedicate this work to
My great parents, whom I could have never done this without their support, encouragement and sacrifices. Thank you for teaching me to believe in myself, in god, and in my dreams.

My dear husband , for supporting me during my thesis work,
My brother, for always being by my side.

My lovely family and friends

Acknowledgement

I am greatly honored to express my deep gratitude ***to Dr. Tarik Salah Morsi****, Professor of fixed prosthodontics, Faculty of Dentistry, Ain Shams University, for his kind supervision, meticulous advice and effort throughout this project. I benefited greatly from his experience and knowledge.*

Many thanks to ***Dr. Maged Mohamed Zohdy****, Associate Professor of Fixed Prosthodontics, Faculty of Dentistry Ain Shams University , for his support , continuous direction, guidance and advice throughout this work .*

I want also to thank ***Dr. Doaa Taha*** *lecturer of fixed prosthodontics, Faculty of Dentistry, Ain Shams University for her efforts , guidance & help with this project*

Special thanks to ***Prof. Dr. Amina Hamdy*** *Professor of Fixed Prosthodontics, Faculty of Dentistry, Ain Shams*

University, for her all-time support and advice & for being one of their students

I also wish to express my special thanks and gratitude to ***prof Dr Marwa Wahsh & Dr. Ahmed Abo Elfadl*** *for thier continuous encouragement and her unlimited willingness for advice and guidance.*

Finally, I would like to thank all my colleagues who have continued to help and support me throughout this project.

Table of Contents

List of figures

List of tables

Introduction

Treatment options for the replacement of a single missing tooth have expanded over the last decades. The edentulous area can be replaced with either conventional metal-ceramic or all-ceramic fixed dental prostheses (FDPs), or implant-retained restorations[1]. Apart from esthetic deficits, conventional FDPs have the disadvantage that 50–70% of sound hard dental tissue is removed by crown preparation[2], which results in loss of tooth vitality in 10% of the cases[3]. Therefore, these options are considered an optimal treatment decision in cases where the adjacent teeth are carious or extensively restored.

In order to enable healthy tooth structure to be preserved as much as possible, new ceramic materials, as well as advances in the field of adhesive cementation techniques were introduced. These have increased the use of all-ceramic crowns and facilitated innovative, conservative preparation designs for single tooth and FDP restorations[3]. In several conditions, such as the presence of pre-existing fillings, or caries and when implant therapy is not an option, inlay-retained fixed dental prostheses (IRFDP) are recommended[4].

Here, the type of abutment preparation can be adapted to the extent of the carious tooth structure or filling, thus minimal tooth substance is lost. IRFDPs are generally fabricated using metal-ceramic, all-ceramic, and fiber-reinforced composite materials, and are considered in some cases alternatives to conventional full coverage restorations[5].

Many studies were carried to investigate the load bearing capacities of IRPDP made from different materials, these studies has showed that minimally invasive inlay preparations restored with pressed glass-ceramics IPS e.max did not achieve the load-bearing capacity required for fixed dental prostheses in the molar

region and showed high failure rate whereas inlays made from yttrium-oxide stabilized zirconia ceramic did[6]. Several factors have been suggested to affect the survival of these IRFDPs. These include, tooth preparation design, the adhesive system and retainer design[7]. To address these problems, modified preparation designs have been developed to improve the stability of IRFDPs. These new designs have been previously described in a case study[8], and similar forms have been described as experimentally suitable in a recent survey of artificial teeth[7].

In contrast to 2 retainer IRFDP clinical studies in the posterior region, for the anterior region clinical trials with both, double-retainer and single-retainer all-ceramic resin-bonded fixed dental prostheses (RBFDPs) have been published[9,10]. A clinical report on the long-term survival rate of one retainer RBFDPs replacing missing anterior teeth showed promising results with a survival rate of up to 92% after 5 years[9]. In this context the question remains if such outcome can also be achieved in the posterior region.

One laboratory study evaluated the effect of different preparation/framework designs on the failure load of zirconia cantilever IRFDPs. In this study, the inlay and wing design had an important influence on the survival of cantilever IRFDPs, as the combination of both mechanical and adhesive retention helped to withstand the highest failure loads[11].

This raises the question, whether modified preparation designs with an additional retainer wing to increase the adhesive bonding area would improve stress distribution leading to better outcomes and load bearing capacities especially in the posterior region. Also whether the use of new materials like PEEK would have a better influence on the load bearing capacities of inlay-retained cantilever fixed dental prostheses (IRCFDP). Therefore, the aim of this study was to evaluate the effect of different retainer designs, on the failure load of all-ceramic IRCFDP for replacement of premolars.

Review of literature

In current dental practice, the treatment philosophy is based on the least invasive approach, whereby intact tooth tissues are conserved as much as possible[12]. Therefore, the interest in partial coverage retainers such as inlays and onlays have increased drastically because these restorations are able to provide a more conservative option requiring minimal tissue removal thus preserving healthy tooth structure to a maximum extent.

Replacement of missing teeth area can be accomplished with resin-bonded fixed dental prostheses (FDPs), conventional fixed dental prostheses (FDPs), implant-supported FDPs, or removable dentures[2]. If a patient rejects an implant treatment and enough sound tooth structure is available it would be desirable to restore a missing tooth with Inlay-Retained Fixed Partial Denture instead of full coverage retained one[13].

In recent years the desire for Inlay-Retained Fixed Partial Dentures (IRFPD) to preserve tooth structure and restrict abutment preparation has increased. Pulpitis and long-term pulpal reactions seem to be considerable risks of crown preparation. In a recent study, irreversible pulpitis and pulpal necrosis had occurred after 10 years in 15.6% of the teeth treated with single crowns and in 32.5% of teeth restored with bridge prosthesis, respectively. Approximately 63–73% of coronal tooth structure is removed when teeth are prepared for all-ceramic crowns[14].

Due to these facts, Partial coverage preparations like inlays, onlays, and over-lays have been recommended as retainers for short span FDPs[2].Important treatment planning requirements should be: a caries-free/minimal caries oral environment; good periodontal condition and orientation of the abutment teeth; sufficient clinical crown height; stable occlusal scheme and desired patient outcomes[2]. Minimally invasive preparation designs for RBFDPs that preserve enamel with increased use of