Surface Corrosion and Roughness of Feldspathic Porcelain Fabricated by Different Techniques

Thesis

Submitted to Crown and Bridge Department
Faculty of Dentistry-Ain Shams University
In Partial Fulfillment of Requirements of the Master Degree in Fixed Prosthodontics

By

Suzan Nabil El Zamzamy

B.D.S (٢٠٠٣)

Faculty of Dentistry
Ain Shams University
٢٠١٢

SUPERVISORS

Dr. Jihan Farouk Mohamed Younis

Assistant Professor of Crown and Bridge
Faculty of Dentistry
Ain Shams University

Dr. Tarek Salah Morsi

Assistant Professor of Crown and Bridge
Faculty of Dentistry
Ain Shams University

Acknowledgment

First of all I would like to thank ***Dr/ Amina M. Hamdy****, Assistant professor of Crown and Bridge, Head of Crown and Bridge Department, Faculty of Dentistry, Ain Shams University for her consistent support to the postgraduate students in the Crown and Bridge department.*

Secondly, I would like to show my great appreciation to ***Dr/ Jihan Farouk Mohamed Younis****, Assistant professor of Crown and Bridge, Faculty of Dentistry, Ain Shams University for her valuable scientific and emotional assistance for this research.*

Also, I want to thank ***Dr/ Tarek Salah Morsy****, Assistant professor of Crown and Bridge, Faculty of Dentistry, Ain Shams University for his continuous scientific guidance and for his time and effort helping my research to be done as soon as possible.*

Dedication

I would like to dedicate this piece of work to;

The soul of my father who guided me through out my life and whom I'm sure would be happy and proud if he's still among us,

My mother and brother who supported me in every possible way to finish my work,

My friends who gave me all the needed emotional support.

Suzan Nabil El Zamzamy

التآكل والخشونة السطحية للبورسالين الفلدسباري المخلق بتقنيات مختلفة

رسالة
مقدمة لكلية طب الفم والأسنان جامعة عين شمس
قسم التيجان والجسور
توطئة للحصول على درجة الماجستير في
التيجان والجسور

مقدمة من
الطبيبة/ سوزان نبيل الزمزمي
بكالوريوس طب الفم و الأسنان
جامعة عين شمس ٢٠٠٣

كلية طب الأسنان – جامعة عين شمس
٢٠١٢

المشرفـــــان

د/ جيهان فاروق محمد يونس

أستاذ مساعد التيجان والجسور
كلية طب أسنان - جامعة عين شمس

د/ طارق صلاح مرسي

أستاذ مساعد التيجان والجسور
كلية طب أسنان - جامعة عين شمس

قَالُواْ سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا
عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

سورة البقرة
(٣٢)

CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Dental ceramic materials are being used increasingly for both anterior and posterior restorations, mainly as a result of their excellent esthetic properties, biocompatibility and resistance to wear. Ceramics for dental reconstructive work are multiphase silicate glass-phase ceramics, glass ceramics or monophased glasses with varying compositions. [١،٢]

Degradation in the oral cavity due to mechanical, chemical or chemical and mechanical influences made these characteristics questionable. Influences of mentioned factors in the oral cavity are inseparable from each other.

If chemical influences are considered, oral cavity is a very aggressive environment for restorative materials. Firstly, saliva pH values constantly change depending on the food intake, amount of plaque present, saliva composition and the stomach acidity. There are numerous in vitro studies investigating chemical degradation of reconstructive materials. [٣]

Chemical degradation of dental ceramics enhances its roughness leading to the wear of the opposing natural tooth or restorative material, greater plaque attachment to the ceramics, weakening of the ceramic structure causing the critical ion ex-change at the surface and enhancing the sensitivity to the future chemical agents. [٤]

Even though dental ceramic materials are considered more or less inert, the possible effects of degradation products on biological systems must not be overlooked. The composition, microstructure and physical

properties of newly launched ceramic materials differ from those traditional ones, which may affect the inertness and/or influence plaque accumulation on exposed surfaces. Safety cannot be inferred or extrapolated from measurements of one ceramic formulation to other compositions or conditions. [٤]

REVIEW OF LITERATURE

Dental Ceramics:

There are several different types of dental porcelains used in dentistry. Feldspathic porcelains, for example, VITA VMK ٩٥ (VITA Zahnfabrik, Bad Sackingen, Germany), are formed from a mixture of potassium feldspar and glass. After incongruent melting, feldspathic porcelains contain ١٩ weight percentage (wt%) of leucite crystals ($K_٢O$ $Al_٢O_٣$ ٤$SiO_٢$) [٥]. Feldspathic porcelains are used as a veneering material for metal ceramic restorations. Feldspathic porcelain provide excellent esthetic and compressive strength[٥].

Driven by a debatable need for metal-free restorations, the evolution of all-ceramic systems for dental restorations has been remarkable in the last three decades. Processing techniques novel to dentistry have been developed, such as heat-pressing, slip-casting, and Computer Aided Design-Computer- Aided Machining (CAD-CAM).

Conventional build up ceramics

Ceramics play an integral role in dentistry. Their use in dentistry dates as far back as ١٨٨٩ when Charles H. Land patented the all-porcelain "jacket" crown. This new type of ceramic crown was introduced in ١٩٠٠s. The procedure consisted of rebuilding the missing tooth with a porcelain covering, or "jacket" as Land called it. While not known for its strength due to internal microcracking, the porcelain "jacket" crown (PJC) was used extensively until the ١٩٥٠s [٦].