Investigation of Mini-Screw Bone Cohesion During Application of Various Orthodontic Forces

A
Thesis

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Dedication

I would like to dedicate this work to my mother ***Dr/ Salwa Mohamed Sobhy*** *as she has and will always be my role model in life.*

I cannot express by words my deep gratitude to my wife, sons, father and my sister for supporting me throughout this work until it reached its end, as a part of their generous help throughout my life.

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LIST OF ABBREVIATIONS

Abbrev.	Full term
Ni-Ti	Nickel-titanium
SAS	Skeletal anchorage system
HA	Hydroxylapatite
MIT	Maximum insertion torque
FT	Fracture torque
MRT	Maximum removal torque
CW	Clockwise direction
CCW	Counterclockwise direction
BMD	Bone mineral density
CBT	Cortical bone thickness
SLAO	Sandblasted, large-grit, and anodic-oxidation
SLA	Sandblasted, large-grit, and acid-etching
TADs	Temporary anchorage devices
MSI	Mini-screw implant
ASTM	American Society for Testing and Materials

Introduction

INTRODUCTION

Since the introduction of fixed appliance, anchorage has always been a challenging question for orthodontists.

According to Newton's third law; "Every action creates a reaction which is equal in magnitude and opposite in direction". Unfortunately, these reactive forces often result in undesirable movements to anchor teeth.

Anchorage is defined as the resistance to unwanted tooth movement. Understanding each patient's anchorage requirements is of paramount importance and ensures high-quality care. Unexpected or unintended anchorage loss frequently results in a compromised finish.

As a result, orthodontists have historically used a variety of appliances and strategies to enhance anchorage, particularly when minimal movement of the teeth providing the anchorage is desired.

Extraoral, intra-arch, and inter-arch mechanics were developed to reinforce anchorage and thereby facilitate a more favorable response. Although such mechanics improve the quality of the final treatment results, they do not permit total control of