

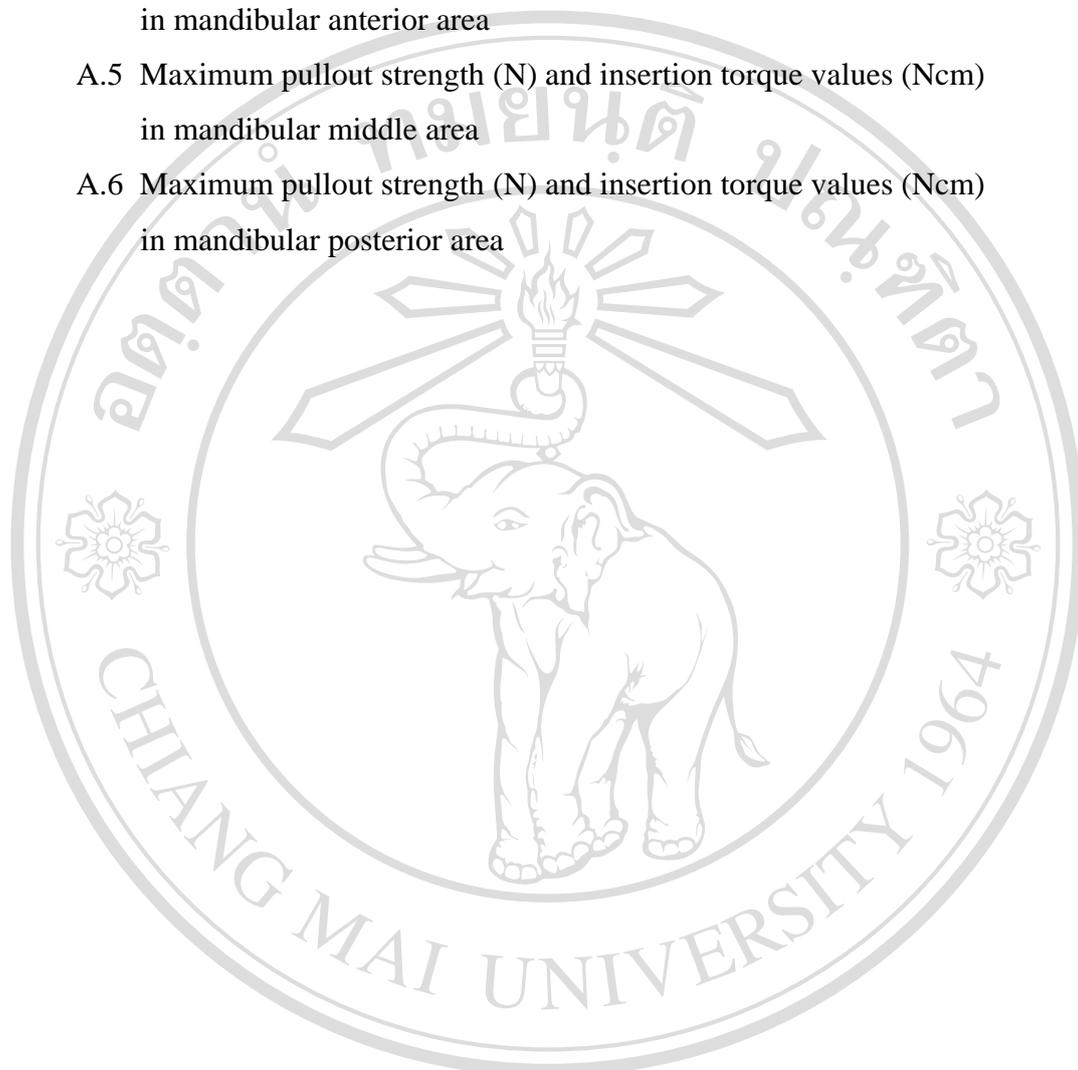
TABLE OF CONTENTS

	PAGE
ACKNOWLEDGEMENTS	iii
ABSTRACT (THAI)	v
ABSTRACT (ENGLISH)	vii
LIST OF TABLES	xi
LIST OF FIGURES	xiii
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 SYSTEMATIC LITERATURE REVIEW: INSERTION ANGLULATION PROTOCOL FOR MINISCREW IMPLANT PLACEMENT INTO THE DENTOALVEOLAR AREA	
2.1) Introduction	3
2.2) Materials and methods	5
2.3) Results	6
2.4) Discussion	15
2.5) Conclusions	19
CHAPTER 3 PILOT STUDY I: ESTIMATION OF PULLOUT STRENGTH OF MINISCREW IMPLANTS IN FRESH MAXILLARY AND MANDIBULAR DENTOALVEOLAR BONE OF PIGS:	
3.1) Introduction	20
3.2) Materials and methods	20
3.3) Results	26
3.4) Discussion	28
3.5) Conclusions	29

LIST OF TABLES

TABLE	PAGE
2.1 Summary of articles identifying safest areas for miniscrew placement	8
2.2 Types of surgical guides	9
2.3 Angles of insertion in the maxilla and mandible	12
3.1 Comparison of maximum pullout strength (N) between areas	27
3.2 Comparison of maximum pullout strength (N) between drilling method	27
4.1 Maximum pullout strength (N) and insertion torque (Ncm) correlated with degrees of insertion angulation	35
5.1 Maximum pullout strength values (N) of miniscrews inserted at angulations in maxilla and mandible	44
5.2 Maximum insertion torque values (Ncm) of miniscrews inserted at angulations in maxilla and mandible	45
5.3 Maximum pullout strength values (N) of miniscrews inserted at angulations in maxilla	45
5.4 Maximum insertion torque values (Ncm) of miniscrews inserted at angulations in maxilla	46
5.5 Maximum pullout strength values (N) of miniscrews inserted at angulations in mandible	47
5.6 Maximum insertion torque values (Ncm) of miniscrews inserted at angulations in mandible	47
A.1 Maximum pullout strength (N) and insertion torque values (Ncm) in maxillary anterior area	64
A.2 Maximum pullout strength (N) and insertion torque values (Ncm) in maxillary middle area	65
A.3 Maximum pullout strength (N) and insertion torque values (Ncm) in maxillary posterior area	66

TABLE	PAGE
A.4 Maximum pullout strength (N) and insertion torque values (Ncm) in mandibular anterior area	67
A.5 Maximum pullout strength (N) and insertion torque values (Ncm) in mandibular middle area	68
A.6 Maximum pullout strength (N) and insertion torque values (Ncm) in mandibular posterior area	69



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
 Copyright© by Chiang Mai University
 All rights reserved

LIST OF FIGURES

FIGURE	PAGE
2.1 Distribution of insertion sites	7
2.2 Distribution of miniscrew implant sites	7
2.3 Distribution of radiographic methods to evaluate accuracy of implant	10
2.4 Distribution of recommended reference planes in the maxilla	11
2.5 Distribution of recommended angulations relative to long axis of tooth reference plane in the maxilla	11
2.6 Distribution of recommended angulations relative to bone surface reference plane in the maxilla	13
2.7 Distribution of recommended reference planes in the mandible	13
2.8 Distribution of recommended angulations relative to long axis of tooth reference plane in the mandible	14
2.9 Distribution of recommended angulations relative to bone surface reference plane in the mandible	14
2.10 Purposes of specific placement angles	15
3.1 Schematic indicating approximate location of screw insertion. <i>Circles</i> indicate positions of screw heads. In each region of the maxilla, the screw was placed in both buccal and palatal sites.	21
3.2 The holding device	22
3.3 The force gauge	22
3.4 The first miniscrew implant attachment design Left: Prepared attachment, Right: Broken neck of miniscrew	23
3.5 The second miniscrew implant attachment design Left: Prepared attachment, Right: Broken attachment	23

FIGURE	PAGE
3.6 The third miniscrew implant attachment design	23
3.7 The fourth miniscrew implant attachment design	24
3.8 The screw driller. A: Slow speed driller, B: manual driller	24
3.9 Three types of manual screwdriver	25
3.10 A: The screw with the fourth attachment was placed in the buccal side of the middle region of the maxilla by manual screw driver. B: The fourth attachment with miniscrew implant in the posterior region of the maxilla	25
3.11 The maxilla and torque gauge were placed on the holding device.	25
3.12 A: The fourth attachment was inserted through the holding device for attachment to the torque gauge. B: The connection between the arm of the fourth attachment and the hook of the Imada torque gauge	26
3.13 Bent miniscrew implants	27
3.14 Maximum pullout strength by location. * $p < 0.05$ (Mann-Whitney U test)	28
4.1 A custom grip was specifically designed to hold the head of the titanium miniscrew	31
4.2 Custom-made holder was specifically designed to hold the bone blocks.	31
4.3 Bone preparation A: Rib bone, B: one being cut, C: cut rib bone	32
4.4 Diagram of alignment of miniscrew implant into bone block	32
4.5 A: Long axis of driller perpendicular to bone surface. B: Long axis of screw perpendicular to bone surface. C: Long axis of driller aligned vertically to the 60-degree bone block. D: Platform placed 1 mm from bone surface.	34
4.6 A: Holder, B: 30-degree bone block C: 60-degree bone block D: 90-degree bone block	35

FIGURE	PAGE
4.7 Maximum pullout strength correlated with insertion angulations. (* $p < 0.05$)	36
4.8 Maximum insertion torque correlated with insertion angulations. (* $p < 0.05$)	36
5.1 Diagram of miniscrew placement. Miniscrews were inserted at 30, 60 and 90 degrees to the bone surface. A minimum clearance of 3 mm between miniscrew implants was maintained.	40
5.2 A custom-made 3-D Surgical Guide was prepared to allow precise miniscrew placement to the bone.	41
5.3 A digital torque wrench was used to assess the maximum insertion torque during miniscrew implant placement.	41
5.4 The platform of the miniscrew head was placed 1mm from the cortical bone surface.	42
5.5 A custom-made base to hold the specimens and a grip to grasp the miniscrew head were specially designed to allow a controlled angle to the axis of the pull.	43
5.6 A custom-made grip was specifically designed to hold the head of the miniscrew.	43
C.1 Poster presented at 6th AIOC in Taiwan	84
C.2 Abstract	85
C.3 Schedule of 6th Asian Implant Orthodontists Conference (AIOC)	86
C.4 Certificate of presentation	87
C.5 Pictures of 6th AIOC	87
C.6 Thai students in Taiwan who were our guides during this trip	88
C.7 KISS team in National Chiang Kai-Shek Memorial Hall, Taipei, Taiwan	88