

CHAPTER 1

Introduction

1.1 Principles and rationales

Nonsyndromic cleft lip and palate is one of the most common congenital facial deformities. Intrinsic developmental deficiency, as well as functional and iatrogenic factors, often result in inhibited maxillary growth. Infants born with cleft lip and palate (CLP) are ideally treated by a multidisciplinary team approach, including primary surgery in infancy to repair the defects and treat associated functional problems. Research works investigating the effect of surgery on facial growth in CLP has shown severe maxillary deficiency in all dimensions in patients who have been operated at early age. In most surgical techniques, mucoperiosteal flaps are raised and displaced medially, and frequently posteriorly. The denuded palatal bone is then covered by scar tissue. The effect of the palatal scar tissue is the influence in dentoalveolar structures. The maxillary tooth eruption and vertical development of the dentoalveolar process could be reduced by the scar. The operated patients with unilateral cleft lip and palate (UCLP) are generally characterized by craniofacial deformities especially in the midfacial area, such as a retroposition of the maxilla. Skeletal discrepancy between the maxilla and mandible often creates Class III malocclusion. In case of maxillary hypoplasia, maxillary orthopedic protraction is one of the most widely used treatment options in growing patients.

Recently, protraction headgear with skeletal anchorage, such as miniplate and miniscrew, has been reported to minimize unfavorable outcome such as proclination of the maxillary incisors, and loss anchorage of the maxillary molars. The infrazygomatic crest is also one of the sites for miniscrew implant placement.¹⁻³ Liou² have found that it is located between the maxillary second premolar and first molar in young patients, but above the maxillary first molar in adults. He also suggested that the proper miniscrew

implant insertion position at the infrazygomatic crest in adult patients should be 14.0 to 16.0 mm above the maxillary occlusal plane. Baumgaertel and Hans¹ in 2009 also reported that the greatest bone depth was located 11.48 mm apical to the buccal cemento-enamel junction of the maxillary first molar in adult dry skulls; however, the anatomy of this site varied considerably.

Accordingly, information from three dimensional cone beam computed tomography (CBCT) at the infrazygomatic crest site, particularly in growing patient, should be analyzed in order to avoid any injuries to dental roots and tooth buds of maxillary posterior teeth and to provide a reliable determination of proper position and direction for miniscrew placement because bone thickness is considered to be the important factor that effects the stability of miniscrew implants.

However, to date, no study has evaluated the bone thickness of the infrazygomatic crest area, appropriate site and angle for insertion of the miniscrew in the infrazygomatic crest area in growing cleft patients. The main purpose of this study was to evaluate and compare bone thicknesses at the infrazygomatic (IZ) crest site at cleft sides with those at non-cleft sides of Thai growing unilateral cleft lip and palate patients (UCLP). The minor purpose was to compare bone thicknesses in non-cleft patients with those at non-cleft sides of UCLP using cone beam computed tomography (CBCT).

1.2 Purposes of the study

1. To evaluate and compare bone thicknesses at the IZ crest site at cleft sides with those at non-cleft sides of Thai growing UCLP
2. To compare bone thicknesses at the IZ crest site in non-cleft patients with those at non-cleft sides of Thai growing UCLP

1.3 Research hypothesis

1. There are significant differences in the buccal bone thickness between non-cleft sides and cleft sides of Thai growing UCLP
2. There are significant differences in the buccal bone thickness between non-cleft patients and non-cleft sides of UCLP

1.4 Research designs and procedures

This study was a retrospective study. Sixty CBCT images were divided into two groups: non-cleft patients (20 images) and unilateral cleft lip and palate patients (40 images). The bone thickness of cleft patients separated into non-cleft sides (20 images) and cleft sides (20 images). The buccal cortical bone thickness, the buccal plate thickness and the biting depth at IZ crest were measured.

1.5 Expecting benefit and goal

The benefit of this study is to suggest the miniscrew placement site at the IZ crest for Thai growing unilateral cleft lip and palate patients with Class III skeletal pattern. Furthermore, the results of this study might provide informative data for further studies on related topics.

1.6 Definitions

- 1.6.1 Maxillary molar occlusal plane: a plane between the mesiobuccal cusp and mesiolingual cusp of the maxillary first molar (Figure 1.1)

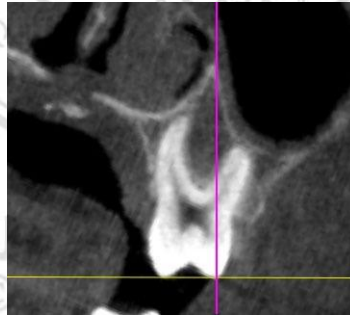


Figure 1.1 Maxillary molar occlusal plane

- 1.6.2 Buccal cortical bone thickness: the distance (mm) between the internal and external aspects of the buccal cortex (Figure 1.2).

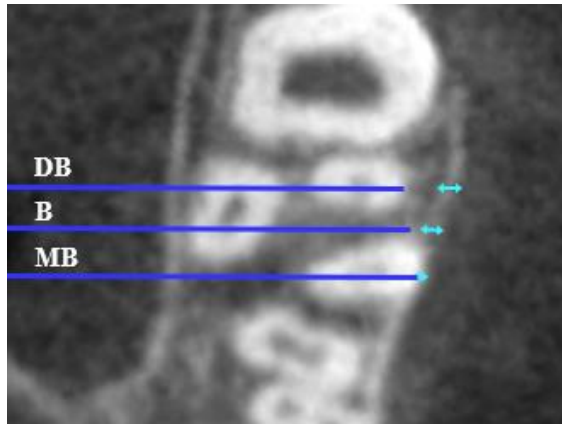


Figure 1.2 Buccal cortical bone thickness

1.6.3 Buccal plate thickness at MB root of 1st molar: the buccal bone thickness from the external aspect of buccal cortex to the buccal outermost point of the MB root of 1st molar parallel to the horizontal line (Figure 1.3).



Figure 1.3 Buccal plate thickness at MB root of 1st molar

1.6.4 Buccal plate thickness at middle of buccal furcation of 1st molar: The middle of the tangential line of the outermost point of MB and DB root of 1st molar to the buccal outermost point of the buccal cortex parallel to the horizontal line (Figure 1.4).

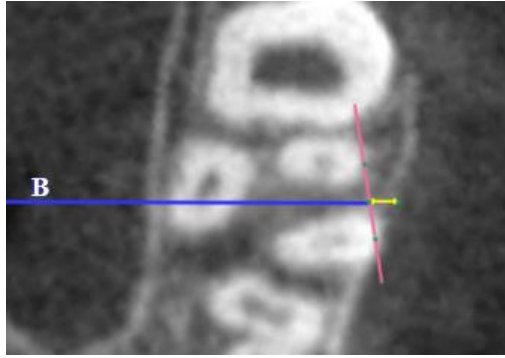


Figure 1.4 Buccal plate thickness at the middle of buccal furcation of 1st molar

1.6.5 Buccal plate thickness at DB root of 1st molar: the buccal bone thickness from the external aspect of buccal cortex to the buccal outermost point of the DB root of 1st molar parallel to the horizontal line (Figure 1.5).

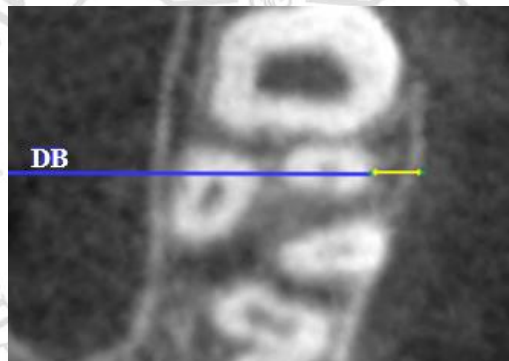


Figure 1.5 Buccal plate thickness at DB root of 1st molar

1.6.6 Biting depth of miniscrew implant: the bone thickness of IZ crest where the postulated miniscrew implant is inserted through (Figure 1.6).



Figure 1.6 Biting depth of miniscrew implant