# P-BR-63

## BASIC RESEARCH

# The measurement of buccal cortical bone thickness with CT images in jaw deformity patients undergoing orthodontic mini-implants

Taisuke Kawai [1], Rieko Asaumi [1], Masutaka Mizutani [2], Akira Yamaguchi [2]

1 Department of Oral and Maxillofacial Radiology, School of Life Dentistry at Tokyo, Nippon Dental University
2 Oral and Maxillofacial Surgery, Nippon Dental University Hospital Niigata Hospital

## Abstract

Recently, placement of orthodontic mini-implants (anchor screws) is widely used in orthodontic treatment. It is necessary to understand anatomical factors in the area of placement with preoperative diagnostic imaging.
We evaluated the buccal cortical thickness of the mesio-distal interdental space at the mandibular first molar with multi-detector low computed tomography (MDCT) images of jaw deformity patients.

MDCT images of 23 jaw deformity patients used for the analysis. All patients had been previously diagnosed as having an Angle class III malocclusion. The cortical thickness on the mesial and distal part of the first molar were measured on the reconstructed cross-sectional images at the level of 5 and 10 mm inferior to the cement-enamel junction (CEJ) on each mesial and distal side. On the same images, the inclination of the mandibular bone was also recorded.
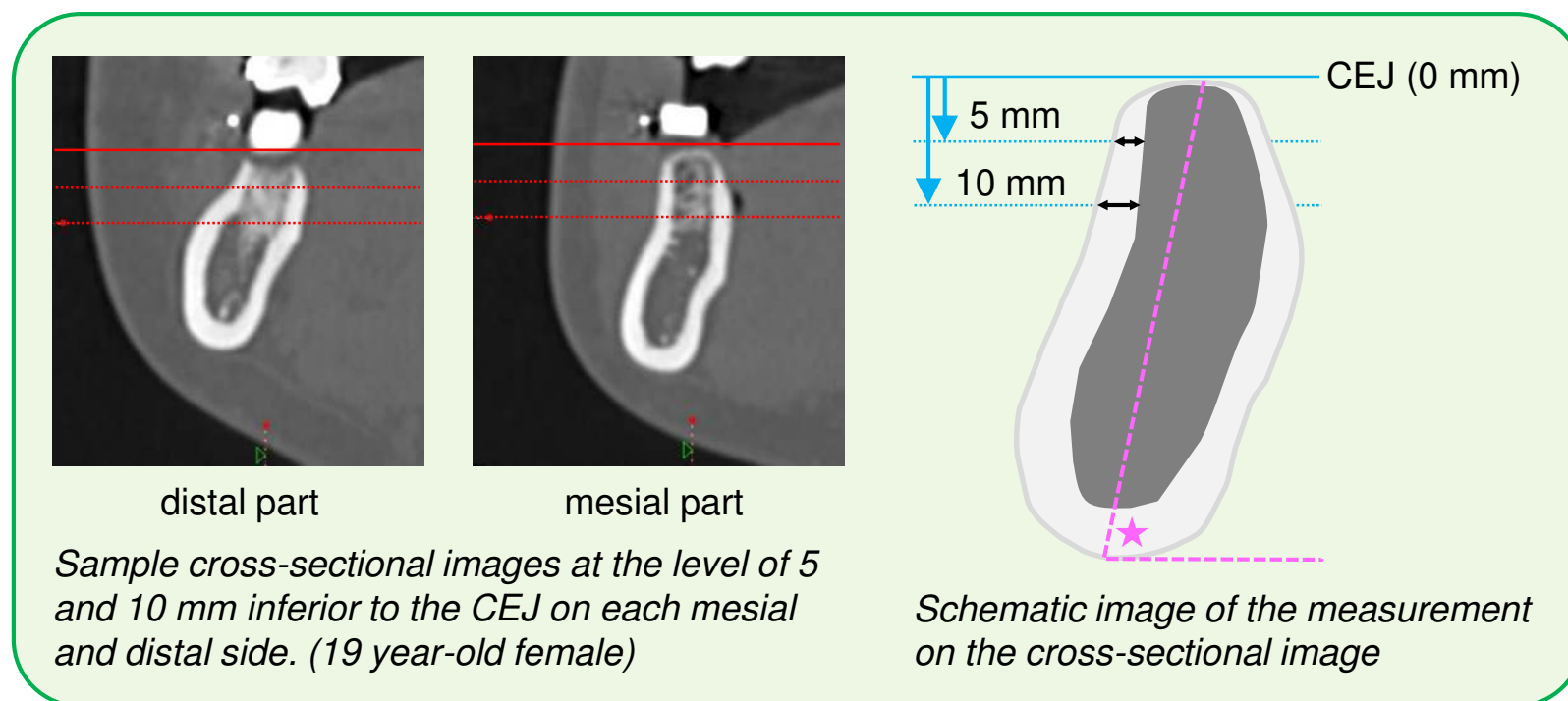
The 23 patients consisted of 15 females and 8 males with a mean age of 22.9 years (range from 18–33 years). The average thickness at the 5 mm and 10 mm level form the CEJ on the mesial portion of the first molar were 1.44 mm and 1.91 mm respectively, and on the distal portion were 1.80 mm and 2.68 mm respectively. Statistical differences were confirmed for buccal cortical thickness at 5 mm and 10 mm from the CEJ in both the mesial and distal portions of the mandibular first molar. The average lingual inclination of the mandible was by 80.5° in the mesial and 71.2° in the posterior portion.

To reduce postoperative discomfort, the clinician should be aware of each patient's anatomical characteristics three dimensionally.

## Results

On the same images, the inclination of the mandibular bone was also recorded.
The MDCT images were excluded from this study if: (1) Pathological findings were seen in the posterior mandible; and (2) The images were found to exhibit insufficient image quality due to metal artifacts from acquisition or patient movement.

Initially, all MDCT images were screened. From these, 5 were excluded according to the exclusion criteria. Thus, a total of 46 sides from 23 patients were used in the analysis. The 23 patients consisted of 15 females and 8 males with a mean age of 22.9 years (range from 18–33 years). The average thickness at the 5 mm and 10 mm level form the CEJ on the mesial portion of the first molar were 1.44 mm and 1.91 mm respectively, and on the distal portion were 1.80 mm and 2.68 mm respectively. Statistical differences were confirmed for buccal cortical thickness at 5 mm and 10 mm from the CEJ in both the mesial and distal portions of the mandibular first molar. The average lingual inclination of the mandible was by 80.5° in the mesial and 71.2° in the posterior portion.



distal part    mesial part

*Sample cross-sectional images at the level of 5 and 10 mm inferior to the CEJ on each mesial and distal side. (19 year-old female)*

*Schematic image of the measurement on the cross-sectional image*

CEJ (0 mm)
5 mm
10 mm

## Background and Aim

Recently, placement of orthodontic mini-implants (anchor screws) is widely used in orthodontic treatment. One of the anatomical factors affecting the stability of the anchor screws is the bone characteristics (shape, bone mineral density, cortical bone thickness). It is necessary to understand anatomical factors in the area of placement with preoperative diagnostic imaging.

In this study, we measured and evaluated the buccal cortical thickness of the mesio-distal interdental space at the mandibular first molar with multi-detector low computed tomography (MDCT) images of jaw deformity patients.

## Conclusion

A detailed understanding of the anatomical characteristics is absolutely critical in maxillofacial surgical procedures, including the placement of anchor screws. To reduce postoperative discomfort, the clinician should be aware of each patient's morphological characteristics.

## Methods and Materials

MDCT images of 28 jaw deformity patients participating in the study were acquired and used for the preoperative planning of sagittal split ramus osteotomy (SSRO) surgery. All patients had been previously diagnosed as having an Angle class III malocclusion. After acquisition of MDCT data, all data were transferred to a workstation and evaluated using Zio Cube software. The standard plane of all MDCT data was set at the occlusal plane. The cortical thickness on the mesial and distal part of the first molar were measured on the reconstructed cross-sectional images at the level of 5 and 10 mm inferior to the cement-enamel junction (CEJ) on each mesial and distal side.

## References

Kakali L et al. Success of palatal implants or mini-screws placed median or paramedian for the reinforcement of anchorage during orthodontic treatment: a systematic review. European Journal of Orthodontics. 2018

Moslemzadeh SH et al. Evaluation of interdental spaces of the mandibular posterior area for orthodontic mini-implants with cone-beam computed tomography. Journal of Clinical and Diagnostic Research. 2017

Alkhatiba R et al. Buccolingual inclination of first molars in untreated adults: A CBCT study. Angle Orthodontist. 2017

Presented at

EAO CONGRESS
EUROPEAN ASSOCIATION FOR OSSEOINTEGRATION
Vienna
2018