

# Relation of the distance from the cemento-enamel junction to the alveolar crest with the thickness of the buccal bone: a cross-sectional cone beam computer tomography study in anterior maxillary teeth

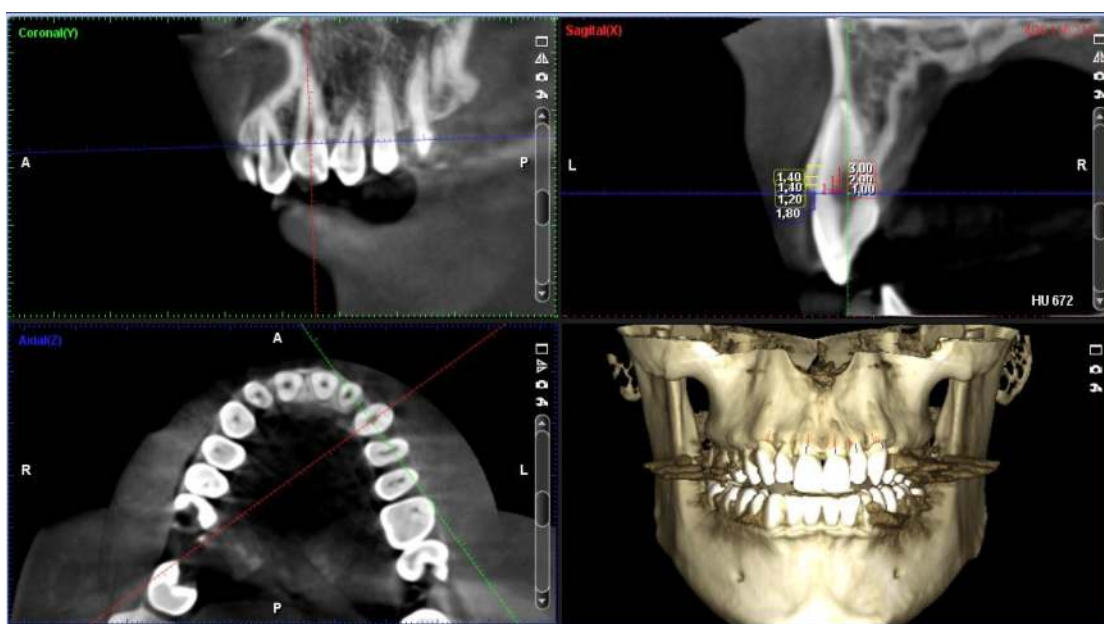
Rojo-Sanchis J, Viña-Almunia J, Peñarrocha-Oltra D, Peñarrocha-Diago M.  
Oral Surgery and Implant Dentistry, Stomatology department, University of Valencia, Spain.

## Abstract

**Background:** In a very high percentage of the cases, the width of the buccal bone at the anterior maxillary teeth is less than 1 mm. At thin vestibular bone crests, the first coronal millimeters are only composed of bundle bone, which will be reabsorbed after exodontia. **Aim:** The objective was to study the relation of the distance between the cemento-enamel junction and the alveolar crest, with the thickness of the buccal bone. Another objective was to evaluate the percentage of maxillary anterior teeth that reached a thickness greater than 1 mm of buccal bone. **Material and methods:** A cross-sectional study was carried out analyzing cone beam computer tomography scans performed for reasons of treatment planning at the Oral Surgery Unit of the University of Valencia. Patients with active periodontal disease, orthodontics or prosthetic restorations in the study teeth and/or in adjacent teeth were excluded. A total of 37 patients were included. Three groups were made according to the distance between the cemento-enamel junction and the buccal bone crest: a) <3.5 mm; b) 3.5-5 mm and c) ≥5 mm. Buccal bone crest thickness measurements were made at 1, 2 and 3 mm apical to the bone crest. **Results:** The mean thickness of the buccal bone crest 1 mm apical to the alveolar crest in groups a, b and c was: 0.86 mm; 0.72 mm; 0.55 mm respectively. All comparisons between the 3 groups in each tooth showed statistically significant differences ( $p > 0.05$ ). **Conclusions and clinical implications:** The higher the distance between the cemento-enamel junction and the alveolar crest, the thinner is the buccal bone crest. The study of the buccal bone width before extraction is a key factor to predict bone loss and to avoid implant treatment complications.

## Background and Aim

In a very high percentage of the cases, the width of the buccal bone crest at the anterior maxillary teeth is less than 1 mm. At thin buccal bone crests, the first coronal millimeters are only composed of bundle bone, which will be reabsorbed after exodontia. **Aim:** The objective was to study the relation of the distance from the cemento-enamel junction to the bone crest, with the thickness of the buccal bone. Another objective was to evaluate the percentage of maxillary anterior teeth that reached a thickness greater than 1 mm of buccal bone.



## Methods and Materials

A cross-sectional study was carried out analyzing cone beam computer tomography scans performed for reasons of treatment planning at the Oral Surgery Unit of the University of Valencia. Patients with active periodontal disease, orthodontics or prosthetic restorations in the study teeth and/or in adjacent teeth were excluded. A total of 37 patients were included. Three groups were made according to the distance between the cemento-enamel junction and the buccal bone crest: a) <3.5 mm; b) 3.5-5 mm and c) ≥5 mm. Width measurements were made by drawing a line along the longitudinal axis of the tooth and then one perpendicular to the height of the buccal cortical. Parallel to this perpendicular, buccal bone crest thickness was measured at 1, 2 and 3 mm apical to the bone crest.

## Results

The mean width of the vestibular cortical according to the distance from the cemento-enamel junction to the crest in groups a), b) and c) were respectively:  $0.77 \pm 0.35$ ,  $0.64 \pm 0.27$ ,  $0.54 \pm 0.22$  at central incisors;  $0.97 \pm 0.48$ ,  $0.78 \pm 0.31$ ,  $0.45 \pm 0.38$  at lateral incisors; and  $0.86 \pm 0.32$ ,  $0.74 \pm 0.25$ ,  $0.68 \pm 0.35$  at canines. All comparisons between the 3 groups in each tooth showed statistically significant differences ( $p > 0.05$ ).

Table 1. Buccal bone thickness

Distance from the bone peak	Tooth	CEJ-BONE (Mean (SD; range))		
		< 3.5	3.5 - 5	> 3.5
1 mm	Central	0.77 (0.35; 0.45-1.8)	0.64 (0.27; 0-1.4)	0.54 (0.22; 0-0.8)
	Lateral	0.97 (0.48; 0.15-2.4)	0.78 (0.31; 0.3-1.8)	0.45 (0.38; 0-1.2)
	Canine	0.86 (0.32; 0.45-1.6)	0.74 (0.25; 0.45-1.4)	0.68 (0.35; 0.15-1.5)
2 mm	Central	0.78 (0.36; 0.45-1.95)	0.61 (0.3; 0-1.6)	0.44 (0.27; 0-0.8)
	Lateral	1.09 (0.67; 0.15-3)	0.77 (0.36; 0.3-1.6)	0.38 (0.39; 0-1.05)
	Canine	0.95 (0.43; 0.45-1.95)	0.79 (0.39; 0.3-1.65)	0.6 (0.38; 0.15-1.65)
3 mm	Central	0.74 (0.34; 0.3-1.8)	0.55 (0.27; 0-1.4)	0.49 (0.34; 0-1.05)
	Lateral	1.07 (0.75; 0.15-3.15)	0.71 (0.36; 0.15-1.35)	0.35 (0.4; 0-1.2)
	Canine	0.89 (0.5; 0.3-2.4)	0.73 (0.38; 0.15-1.65)	0.56 (0.35; 0.15-1.8)

## Conclusions

Buccal bone thickness of the anterior maxillary teeth is thinner when the distance from the cemento-enamel junction to the vestibular bone crest is higher. At periodontal teeth greater alveolar dimensional changes are expected. Further studies analyzing buccal bone resorption after exodontia according the distance from the cemento-enamel junction to the bone crest are needed.

## References

- Nowzari H, Molayem S, Chiu CH, Rich SK. Cone beam computed tomographic measurement of maxillary central incisors to determine prevalence of facial alveolar bone width  $\geq 2$  mm. *Clin Implant Dent Relat Res.* 2012 Aug;14(4):595-602.
- Braut V, Bornstein MM, Belser U, Buser D. Thickness of the anterior maxillary facial bone wall—a retrospective radiographic study using cone beam computed tomography. *Int J Periodontics Restorative Dent.* 2011;31:125–1–31.
- Zekry A, Wang R, Chau AC, Lang NP. Facial alveolar bone wall width – a cone-beam computed tomography study in Asians. *Clin Oral Implants Res.* 2014;25:194–206.
- Fuentes R, Flores T, Navarro P, et al. Assessment of buccal bone thickness of aesthetic maxillary region: a cone-beam computed tomography study. *J Periodontal Implant Sci.* 2015;45:162–16–8.
- Khouri J, Ghosn N, Mokbel N, Naaman N. Buccal Bone Thickness Overlying maxillary Anterior Teeth: A Clinical and Radiographic Prospective Human Study. *Implant Dent.* 2016;25:525–531.
- Rojo J, Viña J, Peñarrocha D, Peñarrocha M. Facial alveolar bone width at the first and second maxillary premolars in healthy patients: A cone beam computed tomography study. *J Oral Implantol.* 2017 Apr 19