

ORIGINAL RESEARCH

Evaluation of anterior maxillary region for dental implant insertion

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ABSTRACT

Background: Due to certain situations, the front maxilla needs to be carefully taken into account while designing dental implant placements. The present study was conducted to assess the maxillary anterior region for dental implant insertion.

Materials & Methods: 58 patients requiring dental implants in maxillary anterior teeth region underwent CBCT scan. Bone height, width and undercut was measured. **Results:** Out of 58 patients, males were 30 and females were 28. The mean height in central incisor region was 18.2 mm, in lateral incisor was 17.4 mm and in canine region was 21.6 mm. The mean width in central incisor region was 8.4 mm, in lateral incisor was 8.2 mm and in canine region was 9.6 mm. The difference was significant ($P < 0.05$). The mean buccal undercut location at central incisor was 5.7 mm, at lateral incisor was 3.8 mm and at canine was 5.2 mm. Buccal undercut depth at central incisor was 0.81 mm, at lateral incisor was 0.84 mm and at canine was 0.76 mm. The difference was significant ($P < 0.05$). **Conclusion:** The greatest breadth and height were observed in canine. With the central incisor, the maximum buccal undercut was observed.

Keywords: Maxilla, central incisor, Dental implant

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INTRODUCTION

Due to certain situations, the front maxilla needs to be carefully taken into account while designing dental implant placements.¹ As soft tissue is typically visible when people smile due to the crowns of their anterior teeth, implant restorations in the anterior maxilla must blend in harmoniously with the neighboring natural teeth to avoid detracting from a person's smile.² Careful treatment planning and risk assessment are necessary to obtain excellent outcomes since the goal is to offer dental implants and restorations that are aesthetically acceptable and in harmony with a patient's natural dentition and nearby restorations.³

It is now normal practice to restore lost teeth in various oral cavity regions with implant therapy. When selecting a course of treatment for future implants, it is critical to understand the anatomy of the alveolar ridges and the thickness of bone around natural teeth, particularly in the esthetic zone.⁴ The final restoration's harmony with the surrounding soft and hard tissues is a key indicator of therapy success. It is a proven fact that following tooth extraction, alveolar bone resorption occurs irrespective of when implants are placed—delayed or immediately. At a reasonably low radiation dosage and reasonable cost,

CBCT produces numerous planar reformatted pictures with great resolution and accuracy.⁵ Variations in voxel settings in the imaging acquisition process will not influence the precision of the measurement.⁶ Multi-slice computerized tomography (MSCT) can reach sub-millimeter accuracy in dimensional measurement.^{7,8} The present study was conducted to assess the maxillary anterior region for dental implant insertion.

MATERIALS & METHODS

The present study comprised 58 patients requiring dental implants in maxillary anterior teeth region. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender, etc. was recorded. Everybody underwent a 5X5 cm CBCT scan of their anterior maxilla using a Planmeca CBCT equipment. The buccal to palatal cortical plate was the measurement point for alveolar breadth. Bone height was measured from the nasal floor to the alveolar crest. The location of the buccal undercut was measured from the point at which the buccal cortical plate began to descend to a line that extended at the alveolar crest and was perpendicular to the alveolar

ridge's long axis. The measurement of the buccal undercut depth was made by tracing a line parallel to the long axis of the ridge and tangent to the deepest

point of the undercut at the buccal plate. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 58		
Gender	Males	Females
Number	30	28

Table I shows that out of 58 patients, males were 30 and females were 28.

Table II Assessment of bone height & bone width

Parameters	Teeth	Mean	P value
Mean height (mm)	Central incisor	18.2	0.12
	Lateral incisor	17.4	
	Canine	21.6	
Mean width (mm)	Central incisor	8.4	0.05
	Lateral incisor	8.2	
	Canine	9.6	

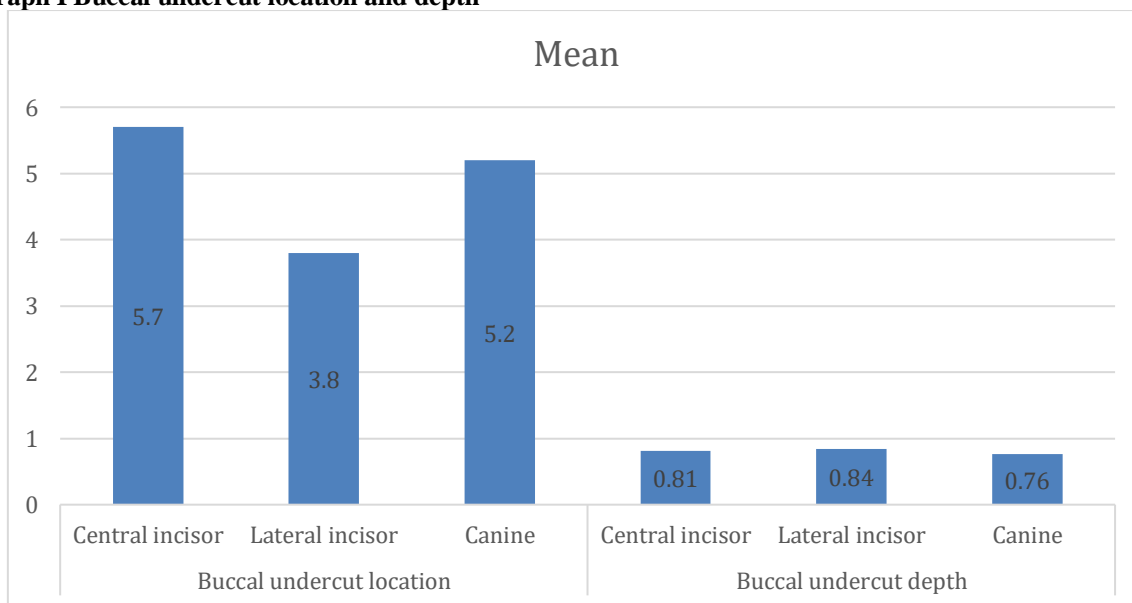
Table II shows that the mean height in central incisor region was 18.2 mm, in lateral incisor was 17.4 mm and in canine region was 21.6 mm. The mean width in central incisor region was 8.4 mm, in lateral incisor was 8.2 mm and in canine region was 9.6 mm. The difference was significant (P< 0.05).

Table III Buccal undercut location and depth

Parameters	Tooth	Mean	P value
Buccal undercut location	Central incisor	5.7	0.04
	Lateral incisor	3.8	
	Canine	5.2	
Buccal undercut depth	Central incisor	0.81	0.03
	Lateral incisor	0.84	
	Canine	0.76	

Table III, graph I shows that mean buccal undercut location at central incisor was 5.7 mm, at lateral incisor was 3.8 mm and at canine was 5.2 mm. Buccal undercut depth at central incisor was 0.81 mm, at lateral incisor was 0.84 mm and at canine was 0.76 mm. The difference was significant (P<0.05).

Graph I Buccal undercut location and depth



DISCUSSION

An anterior maxilla dental implant needed to be carefully evaluated.⁹ It is a proven fact that following

tooth extraction, alveolar bone resorption occurs irrespective of when implants are placed—delayed or immediately.^{10,11} The present study was conducted to

assess the maxillary anterior region for dental implant insertion.

We found that out of 58 patients, males were 30 and females were 28. According to Ferrus et al¹², a significant factor influencing the degree of resorption after tooth extraction was the size of the facial plate of bone before extraction. Research indicates that the preservation of the alveolar crest's vertical dimension after tooth extraction depends on the face plate having a minimum thickness of 2 mm. Furthermore, there seems to be a correlation between the thickness of the facial plate and the level of defect fill after implant implantation. Because facial wall thickness has a major influence on the long-term aesthetic result of dental implant therapy, accurate assessment must be carefully considered before beginning any surgical process.

We found that the mean height in central incisor region was 18.2 mm, in lateral incisor was 17.4 mm and in canine region was 21.6 mm. The mean width in central incisor region was 8.4 mm, in lateral incisor was 8.2 mm and in canine region was 9.6 mm. Cone beam computed tomography (CBCT) scans totaling 184 were included in a study conducted by Gakonyo et al.¹³ A total of 1,104 maxillary anterior teeth, or teeth with buccal bone thickness, were evaluated. In sagittal views, measurements were made at the mid-root level (M2) and 4 mm below the cemento-enamel junction (M1). The teeth under investigation had mean buccal bone thicknesses of 0.55 ± 0.38 mm at M1 and 0.60 ± 0.30 mm at M2. Of all the teeth at M1, 31.61% (349 teeth) and M2, 21.38% (236 teeth) had missing buccal bone walls. At M1 (56.34%) and M2 (68.48%), the majority of the teeth had a thin buccal bone wall (< 1 mm), On the other hand, only 12.05% of teeth at M1 and 10.14% of teeth at M2 had a thick buccal bone (≥ 1 mm). Canines were the primary site of thick buccal bone wall, whereas central incisors were the primary site of thin buccal bone. As age increased, the thickness of the buccal bone at M1 shrank.

We found that mean buccal undercut location at central incisor was 5.7 mm, at lateral incisor was 3.8 mm and at canine was 5.2 mm. Buccal undercut depth at central incisor was 0.81 mm, at lateral incisor was 0.84 mm and at canine was 0.76 mm. Using cone beam computed tomography (CBCT), Tarwneh et al¹⁴ assessed the thickness of the labial and palatal bones at the maxillary anterior teeth as well as the distance from the cemento-enamel junction (CEJ) to the bone crest. The thickness of the labial and palatal bone plates (coronal, middle, and apical thirds) as well as the distance between the CEJ and the alveolar bone crest mid-labially, mesially, and distally were measured for the maxillary front teeth of 120 subject CBCT volumes. For the central incisor roots, the mean bone thickness values at the coronal, middle, and apical thirds of the labial side were, in order, 0.73, 0.69, 0.60 (mm), 0.70, 0.61, 0.49 (mm), and 0.74, 0.53, 0.40 (mm) for the lateral incisor roots. The

palatal bone had a noticeably greater thickness. For every site, the average separation between the mid-labial bone crest and the CEJ was 2.16 mm.

CONCLUSION

Authors found that the greatest breadth and height were observed in canine. With the central incisor, the maximum buccal undercut was observed.

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