Int. J. Morphol.,
43(4):1329-1336, 2025.

Buccal Alveolar Bone Thickness and the Prevalence of Bone Dehiscence and Fenestration in the Anterior and Premolar Maxillary Teeth of Young Vietnamese Individuals: An Evaluation Using CBCT

Grosor del Hueso Alveolar Oral y Prevalencia de Dehiscencia y Fenestración Ósea en los Dientes Maxilares Anteriores y Premolares de Jóvenes Vietnamitas: Una Evaluación Mediante CBCT

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DO, H. T.; VO, T. L. & TRUONG, U. HD. Buccal alveolar bone thickness and the prevalence of bone dehiscence and fenestration in the anterior and premolar maxillary teeth of young Vietnamese individuals: An evaluation using CBCT. *Int. J. Morphol., 43(4)*:1329-1336, 2025.

SUMMARY: The objective of this study was to determine the thickness of the buccal alveolar bone and the prevalence of dehiscence and fenestration in the anterior and premolar maxillary teeth of Vietnamese individuals aged 18–25 using cone-beam computed tomography (CBCT). A total of 121 healthy young Vietnamese individuals aged 18–25 with healthy periodontal status in the anterior and premolar maxillary regions participated in this study and underwent CBCT imaging. Buccal alveolar bone thickness (ABT) and the presence of dehiscence and fenestration were measured and analyzed. Appropriate statistical tests were used to compare differences in ABT, the prevalence of dehiscence and fenestration among the anterior and premolar maxillary teeth groups. The mean age of the participants was 21.8 years, with males comprising 51.2 % of the sample. In order of central incisors, lateral incisors, canines, first premolars and second premolars, the buccal ABT was 1.03 ± 0.23 mm, 1.01 ± 0.22 mm, 1.06 ± 0.21 mm, 1.20 ± 0.26 mm and 1.49 ± 0.44 mm, respectively; The prevalence of dehiscence was 0.41 %, 1.65 %, 6.20 %, 4.96 %, and 0.41 %, respectively; the prevalence of fenestration was 3.72 %, 34.71 %, 27.27 %, 11.16 %, and 0.41 %, respectively. The buccal ABT in the premolar group was significantly greater than that in the anterior teeth ($p < 0.05$). There were significant differences in the prevalence of dehiscence and fenestration among different tooth groups ($p < 0.05$). In young Vietnamese individuals, ABT ≤1 mm was prevalent in the central incisors, lateral incisors and canines. Dehiscence was most common in canines, while fenestration was frequently observed in lateral incisors and canines.

KEY WORDS: Alveolar bone morphology; Cone-beam computed tomography; Facial bone; Dehiscence; Fenestration.

INTRODUCTION

The alveolar bone is one of the four components that make up the periodontium and is a rather unique structure due to its diverse variations depending on the position of the teeth (Hassell, 1993). As a result, it plays an essential role in maintaining periodontal health and influencing aesthetics. Two types of non-inflammatory alveolar bone defects include dehiscence (characterized by a lower alveolar crest, exposing the root surface) and fenestration (not related to the alveolar crest, where the root surface is only covered by the periosteum) (Koke, 2003). These defects may appear immediately after tooth eruption due to root malposition or may develop secondarily as a consequence of a thin alveolar wall under certain influences (Nimigean *et al*., 2009). Evaluating these bone defects is crucial, as gingival recession is always associated with dehiscence (Löst, 1984). The prevalence of gingival recession, which can affect aesthetics, is notably high among the Vietnamese population (72.5 %) (Tung *et al*., 2012).

Apart from dehiscence and fenestration, the thickness of the buccal alveolar bone, especially in the anterior and premolar regions (aesthetic zones), must be carefully analyzed and assessed in various dental treatments such as implant placement, orthodontics, endodontic surgery, and periodontal surgery (Löst, 1984; Nowzari *et al*., 2012; Yagci *et al*., 2012; Yang *et al*., 2015).

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FUNDING. This research was funded by the University of Medicine and Pharmacy at Ho Chi Minh City under contract number 275/ 2024/HD-DHYD, dated 08/27/2024.

Received: 2025-04-02 Accepted: 2025-05-25

Several studies have concluded that a minimum alveolar bone thickness (ABT) of 2 mm is required for optimal healing of both hard and soft tissues, ensuring aesthetic outcomes for dental implants (Huynh-Ba *et al*., 2010; Nowzari *et al*., 2012; Vera *et al*., 2012). The maxillary anterior region is particularly sensitive to dental procedures, especially when the ABT is less than 1 mm (Chappuis *et al*., 2013). The presence of dehiscence and fenestration further reduces tooth support, increases the risk of gingival recession, and raises the likelihood of bone resorption following surgical treatments. This is because these regions lack sufficient nourishment from bone marrow and rely primarily on the periosteum and periodontal connective tissue for blood supply. Therefore, periodontal flap surgery or endodontic surgery that affects the periosteum can lead to significant bone resorption (Yang *et al*., 2015). Additionally, the presence of fenestration may facilitate the spread of endodontic infections and even cause tenderness upon palpation of the gingival surface (Pan *et al*., 2014). In orthodontics, alveolar bone defects may increase the risk of periodontal complications during tooth movement (Jing *et al*., 2021).

In our standing, no study has investigated alveolar bone thickness, bone dehiscence, and fenestration to comprehensively assess the alveolar bone morphology in the anterior and premolar regions of the maxilla in Vietnamese individuals. Therefore, we conducted this study with the objective of investigating the buccal alveolar bone morphology in the maxillary anterior and premolar regions using cone-beam computed tomography in young Vietnamese adults aged 18 to 25.

MATERIAL AND METHOD

Study design and participant selection. The study was approved by the Ethics Committee in Biomedical Research at the University of Medicine and Pharmacy, Ho Chi Minh City, under Decision No. 720/HDDD-DHYD. A total of 121 individuals aged 18 to 25, who visited the Department of Dentistry at the University of Medicine and Pharmacy, Ho Chi Minh City, from August 2023 to July 2024, were included based on the following selection criteria: good general health, consent to participate in the study, no missing or lost teeth in the maxillary anterior and premolar regions. The periodontal tissues in these regions were healthy, with no periodontal pockets > 3 mm, a gingival index of 0-1, a plaque index of 0-1 (Löe, 1967), no interproximal attachment loss, and no tooth mobility. Individuals who were pregnant, had undergone or were undergoing orthodontic, periodontal, or endodontic treatment, had restorations in the study area, or were taking medications that could induce gingival hyperplasia were excluded from the study.

Sample size. The sample size was calculated using the formula for estimating sample size for a proportion:

$$n = \frac{Z^2_{1-\alpha/2}(1-p)p}{d^2}$$

Based on the reported prevalence of dehiscence (8.6 %) (Yang *et al*., 2015) and fenestration (5.4 %) (Jing *et al*., 2021) in Asian populations, we selected $\alpha = 0.05$ and $d = 0.05$. The final sample size determined for this study was 121 participants.

CBCT Imaging. All participants underwent CBCT imaging using an HDX Will CBCT machine (DENTRI-Sa, Korea), with a voxel size of 0.2 mm and a scan time of 20 seconds. The imaging procedure was performed by a trained and calibrated technician.

During the scan, participants were instructed to remove jewelry and glasses from the head and neck region and wear a lead apron for radiation protection. A mouth retractor was placed in the mouth with the handle facing upward. Participants stood upright, grasped the support handles on the machine, rested their chin on the chin support, aligned the midsagittal plane perpendicular to the floor, and ensured the Frankfort plane was parallel to the floor. They bit onto a bite block for stabilization, had their head secured with a head holder, and were instructed to close their eyes and remain still throughout the scan.

Image positioning and 2d film interpretation in three planes (Sun *et al*., 2015)

- The axial plane was adjusted to pass through the cementoenamel junction (CEJ) in both sagittal and coronal views.
- In the axial plane, the coordinate axis was moved to the center of the tooth being measured, and the sagittal section was adjusted along the buccolingual axis, passing through the most prominent buccal and lingual points (Fig. 1A).
- In the coronal plane, the sagittal section was aligned along the root axis, passing through the apex and the midpoint of the incisal edge, excluding excessively curved root apices (Fig. 1B).
- In the sagittal plane, the cross-sectional slice was adjusted along the long axis of the tooth, passing through the root apex and the incisal edge (for premolars, the section passed through the midpoint between the root apex and the central fossa of the occlusal surface) (Fig. 1C).

Measurement of buccal alveolar bone thickness. The thickness of the buccal alveolar bone was measured at a point 1 mm apical to the alveolar crest (in mm) in a direction perpendicular to the root surface in the sagittal plane.

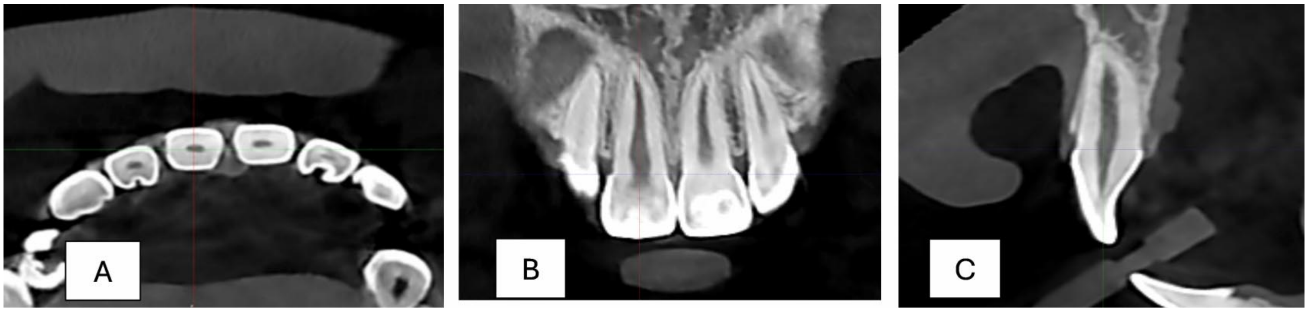

Fig. 1. Steps for identifying measurement plane on imaging software.

Identification and classification of dehiscence according to Yang *et al*., 2015.

The preliminary identification of dehiscence in the buccal and lingual aspects of the study area was performed using the 3D view mode. Bone defects with a V-shaped pattern extending from the alveolar crest toward the root apex were classified as dehiscence (Fig. 2A).

In the next step, the 2D sagittal section of the tooth was analyzed to measure the distance from the CEJ to the highest point of the alveolar crest on the buccal and lingual sides where dehiscence was present. The maximum value was recorded as DEHb (mm) for buccal dehiscence and DEHp (mm) for palatal/lingual dehiscence(Fig. 2B).

Subsequently, in the coronal section, the distance from the CEJ to the highest point of the alveolar crest at the interdental areas on both sides of the tooth was measured. The larger value was recorded as CAI (mm) (Fig. 2C).

- If the difference (DEHb - CAI) > 0, buccal dehiscence was confirmed.
- If the difference (DEHp - CAI) > 0, lingual/palatal dehiscence was confirmed.
- If the difference was ≤ 0, the dehiscence detected in the 3D view was considered a false positive

Classification of bone dehiscence:In the measurement sagittal plane, the root length is determined as the distance from the CEJ on the buccal surface to the root apex along the tooth's vertical axis (L), measured in millimeters.

- Class I: Bone dehiscence occurs on only one tooth surface (either buccal or palatal/lingual), with either DEHb > 0 or DEHp > 0.
  - Division I (DI): DEH < 1/3L
  - Division II (DII): 1/3L ≤ DEH ≤ 2/3L
  - Division III (DIII): DEH > 2/3L, not related to the root apex

- Class II: Bone dehiscence also occurs on only one tooth surface, with either DEHb > 0 or DEHp > 0.
  -DI: DEH > 2/3L, related to the root apex
  -DII: Bone dehiscence associated with periapical lesions
  -DIII: Bone dehiscence associated with bone fenestration

Class III: Bone dehiscence occurs on both tooth surfaces (buccal and palatal/lingual), with both DEHb and DEHp > 0.

Identification and classification of bone fenestration according to Pan *et al*., 2014

Identification of bone fenestration: Bone fenestration is identified based on three key characteristics in the sagittal section of the tooth:
- The root surface is not covered by bone.
- The exposed root region is more prominent than the alveolar bone level.
- It is not related to the alveolar crest.

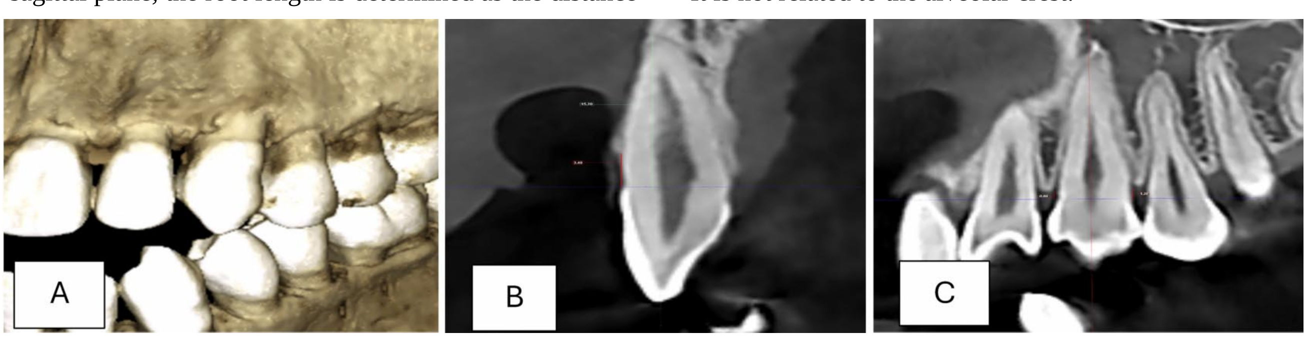

Fig. 2. A. Identification of bone dehiscence on 3D reconstructed images. B. Sagittal plane: measuring the size of the bone dehiscence and the root length. C. Coronal plane: measuring CAI in the interproximal region.

Classification of bone fenestration: Bone fenestration is classified based on its size (FEN), measured in mm (from the gingival margin to the apical limit of the fenestration) relative to the root length (L, in mm). If the fenestration extends to the apical third of the root, it is considered related to the tooth apex. (Fig. 3)

- Type I: FEN < 1/3L, located in the apical third of the root.
- Type II: FEN < 1/3L, located in the middle third of the root.
- Type III: FEN < 1/3L, located in the cervical third of the root.
- Type IV: 1/3L < FEN < 2/3L, related to the tooth apex.
- Type V: 1/3L < FEN < 2/3L, not related to the tooth apex.
- Type VI: FEN > 2/3L, not related to the alveolar crest.

Bias control. The identification of landmarks and measurements was performed by a single trained and calibrated examiner. The intraclass correlation coefficient (ICC) for ABT measurements was 0.92. The Kappa coefficient for dehiscence and fenestration identification was 0.92 and 0.85, respectively.

Statistical analysis

- The Shapiro-Wilk test was used to assess the normality of data distribution.
- The Kruskal-Wallis test analyzed buccal ABT among tooth groups, while the Wilcoxon Rank-Sum test compared it between contralateral teeth.
- The Chi-square test or Fisher's exact test was used to compare the prevalence of dehiscence and fenestration between males and females, as well as among different tooth groups.
- A significance level of a = 0.05 was used to determine statistical significance.
- All analyses were conducted using RStudio software.

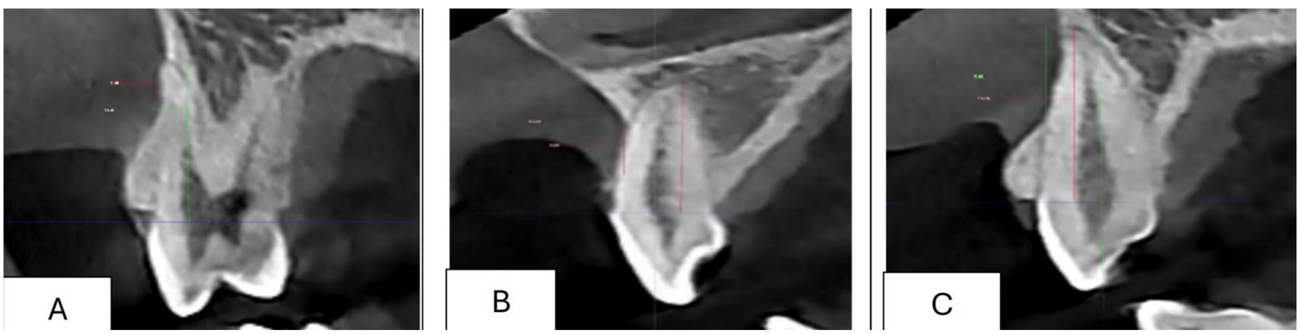

Fig. 3. A. Bone fenestration in the apical third of the root (Type I), B. Bone fenestration in the middle third of the root (Type II), C. Bone fenestration in the apical two-thirds of the root (Type IV.)

RESULTS

A total of 121 participants were included in the study, consisting of 62 males and 59 females, with an average age of 21.8. The total number of anterior and premolar teeth surveyed was 1210.

Table I presents the buccal ABT and the thickness ratio across different tooth groups. There was a statistically significant difference in ABT among the tooth groups ($p < 0.01$). The ABT in the tooth groups was mostly ≤ 2 mm. Specifically, all lateral incisors had an ABT of < 2 mm with an ABT of ≤ 1 mm occupying the highest prevalence.

Table II displays the ABT for each tooth. The right lateral incisors, canines, and second premolars exhibited greater bone thickness compared to the left side ($p < 0.05$).

A total of 22 participants in the study had dehiscences, with a total of 33 dehiscences observed (16 in males, accounting for 2.58 % and 17 in females, accounting for 2.88 %). There was no significant difference in the prevalence of dehiscences between males and females ($p > 0.05$), Chi-Square test. The frequency of participants with 1, 2, and 3 dehiscences was 10.74 %, 5.79 %, and 1.65 %, respectively.

Table III presents the prevalence of dehiscences by tooth group. The highest prevalence was observed in the canines (6.20 %), which was significantly higher than in the central incisors and second premolars, with a statistically significant difference ($p < 0.01$).

Table IV shows the prevalence of dehiscences based on Yang's classification. Class I was the most common class of dehiscence, in which, class I DI dehiscence, which occurs in the cervical third of the root, had the highest prevalence. The study did not detect dehiscence extending across the entire root surface (Class II DI), dehiscence associated with periapical lesions (Class II DII) or dehiscence on the lingual surface (Class III).

Table I. Buccal alveolar bone thickness and thickness level ratio by tooth group.

Buccal alveolar bone thickness (mm)					Thickness level ratio (%)		
Tooth group	**Mean ± SD Median [IQR]**	**Min**	**Max**	**p**	**≤ 1mm**	**>1mm - <2mm**	**≥ 2mm**
Central incisor	1.03 ± 0.23 1.00 [0.89;1.20]	0.45	2.20		54.5	45.0	0.5
Lateral incisor	1.01 ± 0.22 1.00 [0.85;1.20]	0.40	1.80		65.3	34.7	0
Canine	1.06 ± 0.31 1.00 [0.82;1.20]	0.28	2.55	**< 0.01***	53.7	44.6	1.7
First premolar	1.20 ± 0.36 1.20 [1.00;1.40]	0.40	2.60		38.4	57.9	3.7
Second premolar	1.49 ± 0.44 1.40 [1.20;1.65]	0.63	3.41		13.6	71.5	14.9
Overall	**1.16 ± 0.37 1.02 [1.00; 1.28]**	**0.28**	**3.41**		**45.1**	**50.7**	**4.2**

* Kruskal-Wallis test ; IQR: Interquartile Range; Min: minimum; Max: maximun.

Table II. Buccal alveolar bone thickness for tooth.

Tooth	Mean ± SD	Median [IQR]	Min	Max	P
11	1.05 ± 0.23	1.00 [0.89; 1.20]	0.57	1.61	0.6
21	1.02 ± 0.23	1.00 [0.89; 1.20]	0.45	2.20	
12	1.04 ± 0.24	1.00 [0.89; 1.20]	0.40	1.80	**0.04***
22	0.98 ± 0.20	1.00 [0.80; 1.08]	0.57	1.60	
13	1.10 ± 0.31	1.02 [1.00; 1.2]	0.28	2.40	**<0.01***
23	1.02 ± 0.30	1.00 [0.80; 1.20]	0.57	2.55	
14	1.24 ± 0.37	1.20 [1.00; 1.40]	0.60	2.60	0.08
24	1.16 ± 0.35	1.02 [1.00; 1.40]	0.40	2.20	
15	1.55 ± 0.47	1.40 [1.20; 1.80]	0.80	3.41	**0.03***
25	1.42 ± 0.41	1.40 [1.20;1.60]	0.63	2.72	
Total	**1.16 ± 0.37**	**1.02 [1.00; 1.28]**	**0.28**	**3.41**	

* Wilcoxon Rank-Sum test ; IQR: Interquartile Range; Min: minimum; Max: maximun.

Table III. Bone dehiscence ratio by tooth group.

Tooth group	N	n (%)	P
Central incisor	242	**1 (0.41)**[a]**	
Lateral incisor	242	4 (1.65)	
Canine	242	**15 (6.20)**[a,b]**	**< 0.01***
First premolar	242	12 (4.96)	
Second premolar	242	**1 (0.41)**[b]**	
Total	**1210**	**33 (2.73)**	

N: number of teeth examined; n: number of bone dehiscences detected. * Chi-Square Test. ** Fisher's Exact Test (significant difference: comparison between canine and central incisor: p-value: a < 0.01; comparison between canine and second premolar: p-value: b < 0.01

Table IV. Bone dehiscence ratio by Yang *et al*. classification.

Type of dehiscence		n		Percentage (%)	
Class I	DI	19		57.58	
	DII	5	24	15.15	72.73
	DIII	0		0	
Class II	DI	0		0	
	DII	0	9	0	27.27
	DIII	9		27.27	
Class III		0	0	0	0
Total		**33**	**33**		**100**

n: number of bone dehiscences detected

A total of 78 participants in the study had fenestrations, with a total of 187 fenestrations observed (74 in males, accounting for 14.94 % and 113 in females, accounting for 19.15 %). The prevalence of fenestrations was higher in females than in males ($p < 0.05$, Chi-Square test. The frequency of individuals with 1, 2, 3, 4, 5, and 6 fenestrations was 22.3 %, 19.0 %, 8.3 %, 7.4 %, 5.0 %, and 2.5 %, respectively.

Table V presents the prevalence of fenestrations by tooth group. The second premolars had the lowest prevalence of fenestrations (0.41 %). The differences in fenestration prevalence among tooth groups were statistically significant ($p < 0.01$).

Table V. Bone fenestration ratio by tooth group.

Tooth group	N	n (%)	P
Central incisor	242	9 (3.72)	
Lateral incisor	242	84 (34.71)	
Canine	242	66 (27.27)	**< 0.01***
First premolar	242	27 (11.16)	
Second premolar	242	1 (0.41)	
Total	**1210**	**187 (15.45)**	

N: number of teeth examined; n: number of bone fenestration detected. * Fisher's Exact Test

Table VI shows the distribution of fenestration types based on Pan's classification, which includes six different types. Fenestrations located in the apical two-thirds of the root (Type IV) were the most common, accounting for 49.20 % of all cases, followed by Type V fenestrations at 18.72 %. Only 3.2 % of fenestrations involved nearly the entire root (without affecting the alveolar crest), and no Type III fenestrations were observed.

Table VI. Bone fenestration ratio by Pan *et al*. classification

Type of	**n**	**Percentage**
Type I	20	10.70
Type II	34	18.18
Type III	0	0
Type IV	92	49.20
Type V	35	18.72
Type VI	6	3.20
Total	**187**	**100**

n: number of bone fenestration detected.

DISCUSSION

In this study, the average buccal ABT for the central incisors, lateral incisors, canines, first premolars, and second premolars was 1.03 ± 0.23 mm, 1.01 ± 0.22 mm, 1.06 ± 0.31 mm, 1.20 ± 0.36 mm, and 1.49 ± 0.44 mm, respectively. A retrospective study by Zekry *et al*. (2014) on Asian subjects used CBCT to measure the ABT of maxillary teeth. In the age group from 17 to 29 years, the ABT at 1 mm apical to the alveolar crest in the corresponding tooth group was quite similar to the results of our study. These results are quite consistent with the findings of our study. In contrast, although the age range was the same as in our study, the ABT of the central incisors, lateral incisors, and canines in Brazilian individuals was lower (Januário *et al*., 2011). This difference is likely due to racial factors.

The study found that only a small percentage (4.16 %) of teeth had an ABT of ≥ 2 mm, whereas 45.1 % had an ABT of < 1 mm. Notably, all lateral incisors had a bone thickness of < 2 mm. This presents a potential risk factor for implant placement, as it may increase the likelihood of bone resorption and impact the healing process (Nowzari *et al*., 2012).

Among the 121 participants, a total of 33 dehiscences were observed, accounting for 2.73 % of the total surveyed teeth. This prevalence is lower than that reported in other international studies (Yang *et al*., 2015; Sun *et al*., 2022; Nalbantog˘lu & Yanık 2023). Several factors may contribute to this difference, including measurement methods (direct examination of dry skulls versus CBCT imaging), racial differences, and varying diagnostic criteria for dehiscences. Rupprecht *et al*. (2001) noted that different diagnostic criteria for dehiscences can yield different results, making consensus difficult.

Some CBCT studies classify dehiscences as defects where the distance from the cemento-enamel junction (CEJ) to the alveolar crest exceeds 2 mm (Yagci *et al*., 2012; Sun *et al*., 2022). Yang *et al*. (2012) identified dehiscences differently by using 3D imaging to screen for V-shaped bone defects, which were then verified and measured using 2D slices.

In this study, we applied Yang's criteria, as the V-shaped dehiscences observed in 3D imaging provide a key distinction from generalized horizontal bone resorption, U-shaped bone loss, or curved alveolar bone contours. This approach minimizes false positives in CBCT-based assessments. Additionally, research methodology can impact study results. Dehiscence studies primarily rely on two methods: direct observation of dry skulls and CBCT imaging. Dry skulls undergo processing, cleaning, and drying, which can contribute to alveolar bone wear and increase the likelihood of detecting alveolar defects. Furthermore, racial differences may also explain variations in dehiscence prevalence across studies.

In this study, dehiscences were most frequently observed in canines, followed by first premolars ($p < 0.05$). This finding aligns with some studies on worldwide (Edel, 1981; Nimigean *et al*., 2009).

In addition to examining the prevalence of bone dehiscence, the study also investigated the size and location of bone dehiscence using the classification system proposed by Yang *et al*. (2015). Small bone dehiscences may not present clinical symptoms; however, larger dehiscences can weaken the periodontal tissues and lead to gingival recession complications (Yang *et al*., 2015).

In our study, Class I bone dehiscence was the most common (72.73 %). Among them, class I divisionI (57.58 %), which occurs in the gingival third of the root, had the highest prevalence. Class I division II (15.15 %), which extends to the middle third of the root, may be associated with gingival recession in clinical presentation, affecting aesthetics. Bone dehiscence combined with fenestration (Class II division III) accounted for 27.27 % of all bone dehiscences. Additionally, no bone dehiscence was found on the lingual surface, which is consistent with findings from Edel (1981) and Nimigean *et al*. (2009).

More than half of the total study participants had at least one bone fenestration (64.5 %). The prevalence of bone fenestrations in the central incisors, lateral incisors, canines, first premolars, and second premolars were 3.72 %, 34.71 %, 27.27 %, 11.16 %, and 0.41 %, respectively. These results are higher than those reported by Edel (1981), Rupprecht *et al*. (2001), Nimigean *et al*. (2009) and Pan *et al*. (2014) but lower than those found in studies by Nalbantoglu & Yanık (2023) and Sun *et al*. (2022).

Unlike bone dehiscence, the criteria for identifying bone fenestration are generally consistent across most studies. Therefore, the differences in bone fenestration prevalence are likely due to variations in ethnicity, study methodology, tooth region, and the age range of participants. Studies using CBCT imaging have reported a higher prevalence of bone fenestrations compared to studies conducted on dry skulls, as CBCT imaging tends to have a relatively high false-positive rate for detecting fenestrations (Sun *et al*., 2015). This may explain why the prevalence of fenestrations in our study was higher than that reported by Nimigean *et al*. (2009), which was based on dry skull analysis.

However, CBCT imaging remains a completely non-invasive method for assessment and its false-positive rate serves as a risk warning for treatments, particularly in cases where the alveolar bone is extremely thin, below the detection threshold of CBCT imaging.

Different racial groups exhibit varying prevalence rates of bone fenestrations (Edel, 1981; Rupprecht *et al*., 2001; Nimigean *et al*., 2009). However, even within the same Chinese population and using CBCT imaging, studies have reported significant discrepancies in results (Pan *et al*., 2014; Sun *et al*., 2022). This suggests that the image quality used to identify bone fenestrations depends largely on voxel size. Dong *et al*. (2019) found that a voxel size of 0.125 mm provided the highest diagnostic accuracy for bone defects, while 0.2 mm yielded nearly equivalent results. However, a voxel size of 0.4 mm had significantly lower diagnostic accuracy.

When classifying bone fenestrations according to Pan *et al*. (2014), we found that fenestrations in the apical two-thirds of the root (Type IV) were the most common (49.20 %), followed by Type V fenestrations (cervical two-thirds) at 18.72 % ($P < 0.05$). This suggests that medium-sized fenestrations (two-thirds of the root length) are the most prevalent, typically extending toward the apical region. Similar to studies by Pan *et al*. (2014) and Nalbantoglu & Yanik (2023), our study did not detect fenestrations in the cervical third of the root (Type III).

Our study identified 2.73 % of cases with bone dehiscence, predominantly in the canine region, and 15.45 % of cases with bone fenestration, mostly in the maxillary lateral incisors. Greater caution is required when performing dental procedures in these high-risk teeth. If bone defects are exposed after flap elevation, it is crucial not to remove the periodontal ligament tissue covering the root surface and to ensure that the flap provides adequate vascular supply, as the affected bone area already lacks blood supply from the alveolar bone. When using coronally or laterally advanced flaps, some researchers recommend a split-thickness flap to minimize bone resorption and optimize blood supply to the recipient site (Wood *et al*., 1972). However, in cases where bone dehiscence occurs in areas with thin gingival–mucosal tissue, a full-thickness flap may be more appropriate.

In cases where thin bone is combined with fenestrations, there is a higher likelihood of dehiscence formation or further enlargement of an existing dehiscence (Moghaddas & Stahl, 1980). Our study revealed that most fenestrations in the anterior and premolar regions of the maxilla were large (extending two-thirds of the root length), leaving minimal remaining alveolar crest. This may significantly increases the risk of future gingival recession following flap surgery.

CONCLUSION

In young Vietnamese individuals, the alveolar bone thickness ≤1 mm was prevalent in the central incisors, lateral incisors and canines. Dehiscence was most common in canines, while fenestration was frequently observed in lateral incisors and canines. Evaluating the alveolar bone to have a comprehensive treatment plan is important to prevent gingival recession in aesthetic regions.

DO, H.T.; VO, T.L. & TRUONG, U.HD. Grosor del hueso alveolar oral y prevalencia de dehiscencia y fenestración ósea en los dientes maxilares anteriores y premolares de jóvenes vietnamitas: Una evaluación mediante CBCT. *Int. J. Morphol., 43(4)*:1329-1336, 2025.

RESUMEN: El objetivo de este estudio fue determinar el grosor del hueso alveolar oral y la prevalencia de dehiscencia y fenestración en los dientes maxilares anteriores y premolares de jóvenes vietnamitas de 18 a 25 años mediante tomografía computarizada de haz cónico (CBCT). Un total de 121 jóvenes vietnamitas sanos de 18 a 25 años con estado periodontal sano en las regiones maxilares anterior y premolar participaron en este estudio y se sometieron a imágenes de CBCT. Se midieron y analizaron el espesor óseo alveolar oral (ABT) y la presencia de dehiscencia y fenestración. Se utilizaron pruebas estadísticas apropiadas para comparar las diferencias en ABT, la prevalencia de dehiscencia y fenestración entre los grupos de dientes maxilares anteriores y premolares. La edad media de los participantes fue de 21,8 años, y los varones representaron el 51,2 % de la muestra. En orden de incisivos centrales, incisivos laterales, caninos, primeros premolares y segundos premolares, el ABT oral fue de 1,03 ± 0,23 mm, 1,01 ± 0,22 mm, 1,06 ± 0,21 mm, 1,20 ± 0,26 mm y 1,49 ± 0,44 mm, respectivamente; La prevalencia de dehiscencia fue del 0,41 %, 1,65 %, 6,20 %, 4,96 % y 0,41 %, respectivamente; la prevalencia de fenestración fue del 3,72 %, 34,71 %, 27,27 %, 11,16 % y 0,41 %, respectivamente. El ABT vestibular en el grupo de premolares fue significativamente mayor que en los dientes anteriores ($p < 0,05$). Se observaron diferencias significativas en la prevalencia de dehiscencia y fenestración entre los diferentes grupos dentarios (p < 0,05). En jóvenes vietnamitas, el ABT ≤1 mm fue prevalente en los incisivos centrales, laterales y caninos. La dehiscencia fue más común en los caninos, mientras que la fenestración se observó con frecuencia en los incisivos laterales y caninos.

PALABRAS CLAVE: Morfología del hueso alveolar; Tomografía computarizada de haz cónico; Hueso facial; Dehiscencia; Fenestración

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