



2019年度大會壁報論文比賽作品欣賞

醫院組佳作

林口長庚—張中杰



參考牙根表面積及牙冠-牙根比值以評估牙周炎嚴重度及牙齒預後 Root surface area and crown-root ratio as references to relate periodontitis severity and prognosis



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Introduction

Crown-to-root ratio (CRR) has been applied to estimate the severity of periodontitis and to assign tooth prognosis. CRR value of 1:1 has been used to differentiate a tooth from favorable prognosis to unfavorable prognosis¹. However, CRR is a linear ratio and lack of information to correlate CRR with 3D root surface area (RSA) and discuss more detail in different CRRs to assess the periodontitis severity and tooth prognosis.

Micro-computed tomography (micro-CT) had developed for decades and recently had been used in dental field with high image resolution². The aim of the present study was to use micro-CT to survey extracted human single rooted premolars and measure the RSAs at the different CRR levels.

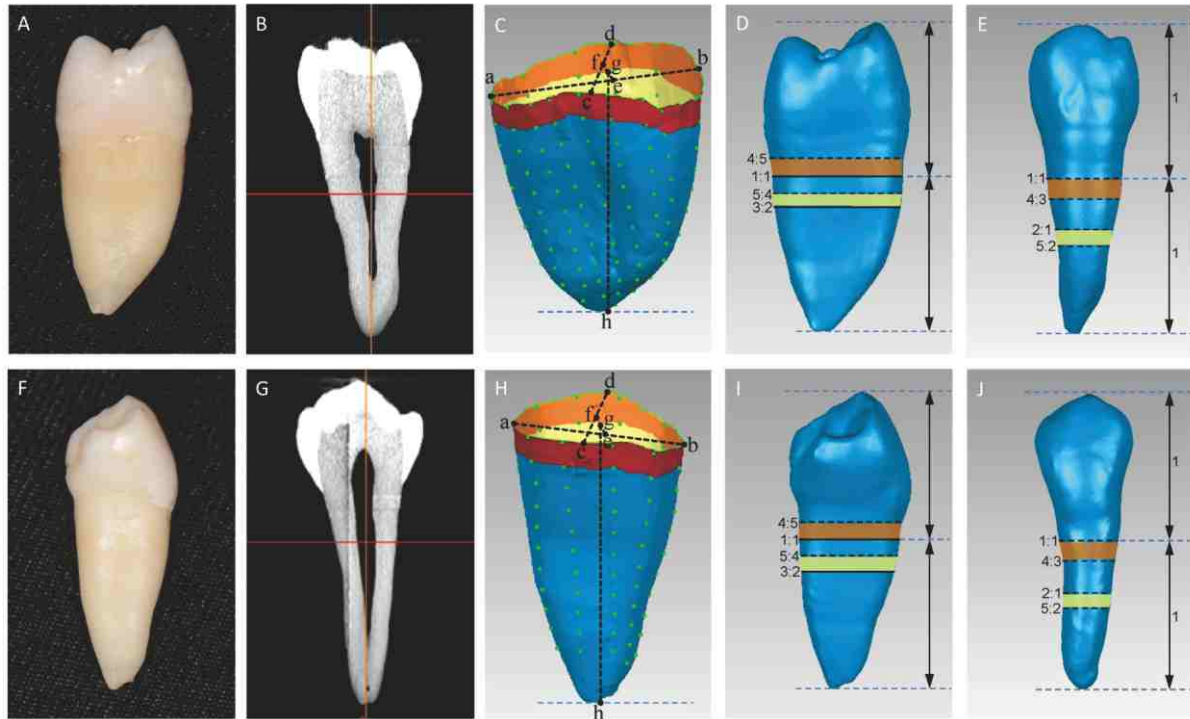
Material and Methods

A total of 35 mandibular and 31 maxillary single-rooted human premolars were scanned by micro-CT (SkyScan1076) and analyzed using software (DataViewer, CTVol, Pro/Engineer). The 2D root length (RL) of a scanned premolar was determined by measuring the distance from the apex to an average cemento-enamel junction (CEJ) point (g-h in Figure 1 C and H). The amount and percentage of RSAs and liner-radiographic bone loss (L-RBL) at the evaluated CRRs of 4:5, 1:1, 5:4, 4:3, 3:2, 2:1 and 5:2 were analyzed (Figure 1 D,E;I,J).

Independent t-tests were used to compare the difference between maxillary and mandibular premolars. Paired t-tests were applied to compare the L-RBL and RSA at corresponding CRRs. One-sample t-test assessed the difference between measured and proposed RSAs or L-RBLs at evaluated CRRs.

Results

Figure 1. Views and estimated levels of a micro-CT scanned maxillary premolar (A–E) and mandibular premolar (F–J). Sagittal section of premolar (B and G). STL format model, g–h: representing the 2D RL (C and H); Corresponding CRRs to periodontal severity (D and I); Corresponding CRRs to periodontal prognosis (E and J)



Discussion

Applying CRR to periodontal severity

According to the consensus report from American Academy of Periodontology (AAP) in 2017³, the severity of periodontitis can be divided into stage I to IV. Stage I (mild) periodontitis is defined as interdental clinical attachment loss (CAL) 1-2mm or L-RBL<15%. CRR of 4:5 is in accordance to 15% L-RBL(Figure 1D,I; Table 1). Stage II (moderate) periodontitis is defined as CAL 3-4mm or 15% to 33% L-RBL. CRR 1:1 can be fitted in this category. Stage III or IV (severe) periodontitis is defined as ≥5mm CAL or L-RBL>33% and CRR of 4:3 is equal to L-RBL 33% (Table 1;Figure 1E,J).

Applying RSA and CRR to periodontal prognosis

The teeth with approximately 25% CAL have been categorized into fair prognosis⁴. The percentage of RSA was difficult to measure clinically. Therefore, percentages of L-RBL and linear CAL were applied to confer tooth prognosis. The

measurement of a CRR of 1:1, 3.0 mm L-RBL, and >25% RSA at coronal 25% L-RBL levels for premolars corresponded to the fair prognosis by the McGuire definitions⁴. However, when linear CAL was applied to define tooth prognosis, at least 1.0 mm connective tissue attachment should be taken into account⁵. A measurement of 1.0 mm linear RL bone support was comparable to 10% RSA for the coronal half of the RL in this study(Table 1). Values of 35% L-RBL, >4 mm L-RBL and 45% RSA at a CRR of 4:3 correlated with a fair prognosis level(Table 1; Figure 1 E,J).

Furthermore, values of 50% L-RBL, >6.0 mm L-RBL, and 60% RSA at a CRR of 2:1 for premolars without a 1.0 mm connective tissue inclusion could be applied to differentiate poor prognosis from questionable prognosis. However, when the location of 50% linear CAL was used to distinguish poor from questionable prognosis, the differentiated level moved apically to a position of 60% L-RBL, ≥7.0 mm L-RBL, and 70% RSA at a CRR of 5:2 (Table 1; Figure 1 E,J).

Table 1. The amount and percentages of root surface area (RSA) and linear radiographic bone loss (L-RBL) at evaluated crown-to-root ratios (CRRs).

	Maxillary premolars (n=31)	Mandibular premolars (n=35)	Maxilla vs. Mandible <i>p</i> < 0.05
	Mean ± SE	Mean ± SE	
RSA & L-RBL at CRR = 4:5			
RSA% (vs. 20% RSA)	18.17 ± 1.62% (HO)	19.98 ± 1.57% (HO)	<i>p</i> = 0.427
L-RBL mm & % (vs. 15%)	1.62 ± 0.15 mm & 12.68 ± 1.07% (HO)	1.88 ± 0.17 mm & 13.58 ± 1.11% (HO)	<i>p</i> = 0.567
RSA % vs. L-RBL %	<i>p</i> < 0.001	<i>p</i> < 0.001	
RSA & L-RBL at CRR = 1:1			
RSA% (vs. 25% RSA)	25.62 ± 1.22% (HO)	28.35 ± 1.23% (HO)	<i>p</i> = 0.122
L-RBL mm & % (vs. 20% & 25%)	2.72 ± 0.14 mm & 21.41 ± 0.97% (HO)	3.02 ± 0.18 mm & 22.22 ± 1.00% (HO)	<i>p</i> = 0.567
RSA % vs. L-RBL %	<i>p</i> < 0.001	<i>p</i> < 0.001	
RSA & L-RBL at CRR = 5:4			
RSA% (vs. 40% RSA)	40.88 ± 1.65% (HO)	42.35 ± 1.53% (HO)	<i>p</i> = 0.516
L-RBL mm & % (vs. 30%)	3.82 ± 0.14 mm & 30.15 ± 0.86% (HO)	4.16 ± 0.18 mm & 30.86 ± 0.89% (HO)	<i>p</i> = 0.567
Lost RSA % vs. L-RBL %	<i>p</i> < 0.001	<i>p</i> < 0.001	
RSA & L-RBL at CRR = 4:3			
RSA% (vs. 45% RSA)	44.45 ± 1.55% (HO)	45.27 ± 1.56% (HO)	<i>p</i> = 0.710
L-RBL mm & % (vs. 35%)	4.14 ± 0.14 mm & 32.64 ± 0.83% (HO)	4.48 ± 0.19 mm & 33.33 ± 0.86% (HO)	<i>p</i> = 0.567
Lost RSA % vs. L-RBL %	<i>p</i> < 0.001	<i>p</i> < 0.001	
RSA & L-RBL at CRR = 3:2			
RSA% (vs. 50% RSA)	48.67 ± 1.34% (HO)	49.67 ± 1.32% (HO)	<i>p</i> = 0.599
L-RBL mm & % (vs. 40%)	4.71 ± 0.14 mm & 37.13 ± 0.77% (HO)	5.07 ± 0.19 mm & 37.77 ± 0.80% (HO)	<i>p</i> = 0.567
Lost RSA % vs. L-RBL %	<i>p</i> < 0.001	<i>p</i> < 0.001	
RSA & L-RBL at CRR = 2:1			
RSA% (vs. 60% RSA)	60.07 ± 1.06% (HO)	61.15 ± 1.31% (HO)	<i>p</i> = 0.532
L-RBL mm & % (vs. 50%)	6.03 ± 0.14 mm & 47.61 ± 0.64% (HO)	6.44 ± 0.20 mm & 48.15 ± 0.67% (HO)	<i>p</i> = 0.567
Lost RSA % vs. L-RBL %	<i>p</i> < 0.001	<i>p</i> < 0.001	
RSA & L-RBL at CRR = 5:2			
RSA% (vs. 70% RSA)	67.59 ± 1.16% (HO)	69.34 ± 1.24% (HO)	<i>p</i> = 0.322
L-RBL mm & % (vs. 60%)	6.97 ± 0.14 mm & 55.09 ± 0.52% (HO)	7.74 ± 0.30 mm & 58.01 ± 1.82% (HO)	<i>p</i> = 0.567
Lost RSA % vs. L-RBL %	<i>p</i> < 0.001	<i>p</i> < 0.001	

Independent *t* test for maxilla vs. mandible: *, *p* < 0.05, **, *p* < 0.01, ***, *p* < 0.001

Paired *t* tests for L-RBL % vs. RSA %: *, *p* < 0.05, **, *p* < 0.01, ***, *p* < 0.001

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Conclusions

1. Mild, moderate and severe periodontitis could be differentiated according to CRR 4:5 and 4:3, respectively. CRR of 1:1 could be categorized as moderate periodontitis.
2. Values of 35% L-RBL at a CRR of 4:3 corresponded to a 25% CAL, which could be applied to distinguish a fair prognosis from a good prognosis, and values of 60% L-RBL at a CRR of 5:2 corresponded to a 50% CAL, which is used to differentiate a poor prognosis from a questionable prognosis

References

1. Avila, G., et al., A novel decision-making process for tooth retention or extraction. *J Periodontol*, 2009. 80(3): p. 476–91.
2. Gu, Y., et al., Measurement of root surface area of permanent teeth with root variations in a Chinese population-A micro-CT analysis. *Arch Oral Biol*, 2016. 63: p. 75–81.
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論文原稿

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Root surface area and crown-root ratio as references to relate periodontitis severity and prognosis

張中杰 (Chang, Chung-Chieh) 洪祥熙 (Hong, Hsing-Hsi)
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Independent *t*-tests were used to compare the difference between maxillary and mandibular premolars. Paired *t*-tests were applied to compare the L-RBL and RSA at corresponding CRRs. One-sample *t*-test assessed the difference between measured and proposed RSAs or L-RBLs at evaluated CRRs.

Results

Figure 1. Views and estimated levels of a micro-CT scanned maxillary premolar (A-E) and mandibular premolar (F-J). Sagittal section of premolar (B and G). STL format model, g-h: representing the 2D RL (C and H); Corresponding CRRs to periodontal severity (D and I); Corresponding CRRs to periodontal prognosis (E and J)

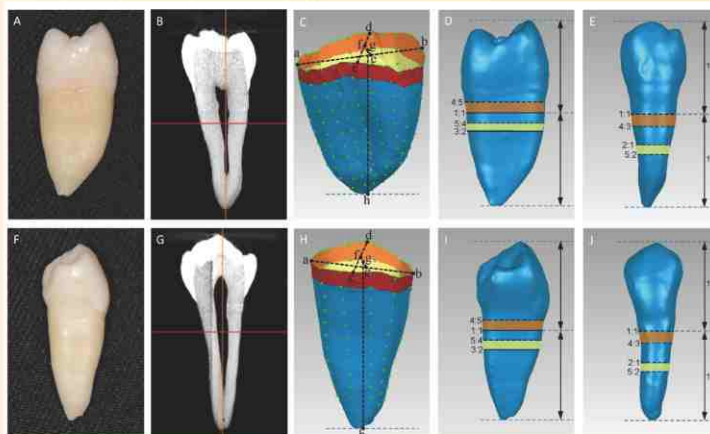


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L-RBL mm ± % (vs. 15%)	1.82 ± 0.13 mm ± 12.68 ± 1.87% (SD)	1.88 ± 0.17 mm ± 13.58 ± 1.11% (SD)	p = 0.587
RSA % vs. L-RBL %	p < 0.001	p < 0.001	
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RSA % vs. L-RBL %	p < 0.001	p < 0.001	
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References

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醫院組佳作

林口長庚—戴劭妤



Survey of Torus Palatinus in Patients with End-Stage Renal Disease Undergoing Hemodialysis

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Introduction

Oral tori are usually found accidentally during dental examinations. Torus palatinus (TP) develops along the midpalatal suture. The etiology of oral torus is complex and may involve environmental factors such as occlusal (biting) forces as well as genetic factors which modify the risk for developing torus. Abnormal calcium, phosphorus, and vitamin D metabolism are very common in patients with end stage renal disease and causes secondary hyperparathyroidism. Hyperparathyroidism causes the skeletal disturbances that are characteristic of renal osteodystrophy. Bony pathologies occurring in both jaw bones were found in 29.8% of the cases reviewed. Based on a study conducted in 2012, Sismans et al. reported a prevalence rate of TP (41.7%) in patients undergoing peritoneal dialysis (PD). The authors went on to propose that the higher prevalence of TP in PD patients might be attributable to renal osteodystrophy. The prevalence rates of TP in hemodialysis (23.5%) and peritoneal dialysis patients (34.3%) have also been reported by Chao et al. and Hsu et al., respectively. Therefore, the objective of this study was to examine the oral findings of a larger group of hemodialysis patients to determine the prevalence and predictors for TP in this patient population.

Method

Patients. This prospective observational study included 322 hemodialysis patients recruited from the Taoyuan branch of the Chang Gung Memorial Hospital, Taiwan, between August 2016 and December 2016. Patients were stratified into 2 groups based on the presence or absence of TP.

Diagnosis of TP. Investigations of the oral cavity consist of inspection and palpation. The shapes of TP were categorized as flat, spindle, nodular, or lobular (Figure 1). The locations of TP were near incisors, premolars, or molars.

Laboratories. Blood specimens were collected within a few days of a clinical examination that occurred during stable hemodialysis sessions to minimize the effect of any acute events.

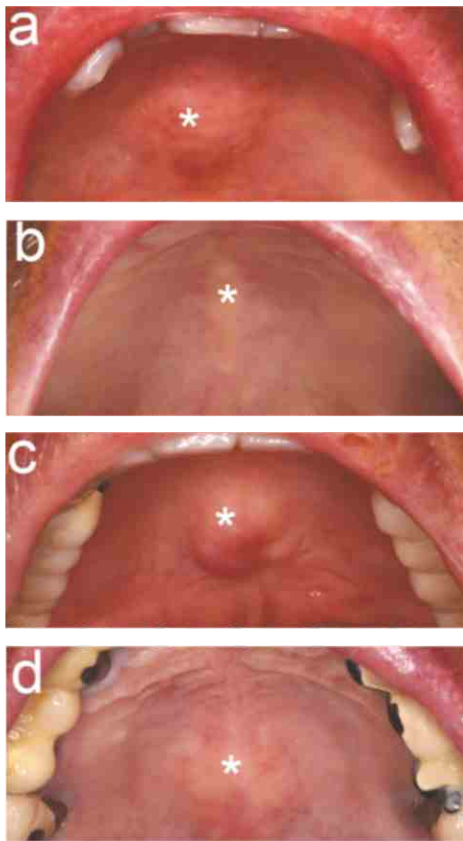


Figure 1. 4 types of torus palatinus: flat (a), spindle (b), nodular (c), and lobular (d).

Result

Subject Characteristics.

The prevalence rate of TP in this study was 28.9% (Table 1). Patients with TP were younger in age than those without [57.8 ± 10.0 vs 62.4 ± 12.3 years old; $P=0.001$], and there were more female patients with TP than their male counterparts (60.2% vs 38.0%; $P < 0.001$).

Laboratory Findings.

Blood tests revealed that patients with TP had higher

Variable	All patients (n = 322)	Patients with TP (n = 93)	Patients without TP (n = 229)	P value
Baseline characteristics				
Age, year	61.1 ± 11.8	57.8 ± 10.0	62.4 ± 12.3	0.001**
Female gender, n (%)	143 (44.4)	56 (60.2)	87 (38.0)	0.000***
Hypertension, n (%)	164 (50.9)	48 (51.6)	116 (50.7)	0.876
Diabetes mellitus, n (%)	114 (35.4)	32 (34.4)	82 (35.8)	0.812
Dialysis duration, months	107.1 ± 82.3	103.6 ± 85.2	108.6 ± 81.3	0.622
Laboratory findings				
Blood urea nitrogen, mg/dL	67.4 ± 17.7	68.9 ± 15.3	66.8 ± 18.6	0.341
Creatinine, mg/dL	10.3 ± 2.1	10.4 ± 1.9	10.3 ± 2.1	0.566
Estimated glomerular filtration rate, mL/min/1.73 m ²	4.8 ± 1.1	4.5 ± 1.1	4.8 ± 1.1	0.017*
Uric acid, mg/dL	6.7 ± 1.3	7.0 ± 1.2	6.7 ± 1.3	0.036*
Sodium, mEq/L	137.8 ± 2.8	137.7 ± 2.8	137.9 ± 2.8	0.716
Potassium, mEq/L	4.7 ± 0.7	4.8 ± 0.6	4.6 ± 0.7	0.013*
Chloride, mEq/L	99.1 ± 2.9	99.1 ± 3.1	99.1 ± 2.8	0.925
Calcium, mg/dL	9.7 ± 0.9	9.6 ± 0.9	9.7 ± 1.0	0.771
Phosphate, mg/dL	5.0 ± 1.2	5.4 ± 1.1	4.9 ± 1.1	0.001**
Bicarbonate, mmol/L	21.7 ± 2.4	20.9 ± 2.4	22.0 ± 2.3	0.000***
Fasting glucose, mg/dL	117.0 ± 53.0	114.5 ± 54.2	118.0 ± 52.6	0.596
Albumin, g/dL	4.0 ± 0.3	4.0 ± 0.3	3.9 ± 0.3	0.108
WBC, 10 ³ /uL	6.4 ± 1.9	6.8 ± 2.1	6.2 ± 1.8	0.014
RBC, 10 ⁶ /uL	3.6 ± 0.5	3.6 ± 0.5	3.6 ± 0.6	0.339
Hemoglobin, g/dL	10.4 ± 1.2	10.3 ± 1.2	10.5 ± 1.2	0.316
Hematocrit, %	32.0 ± 3.6	31.7 ± 3.5	32.1 ± 3.6	0.335
MCV, fL	89.0 ± 7.5	89.1 ± 6.5	89.0 ± 7.9	0.903
MCH, pg/Cell	29.0 ± 2.8	29.0 ± 2.5	28.9 ± 3.0	0.928
MCHC gHb/dL	32.5 ± 1.0	32.5 ± 0.9	32.5 ± 1.1	0.753
RDW, %	14.5 ± 1.4	14.4 ± 1.5	14.6 ± 1.3	0.135
Platelet count, 10 ³ /uL	184.3 ± 63.7	200.3 ± 61.8	177.8 ± 63.4	0.004**
Intact parathyroid hormone, pg/mL	325.7 ± 311.4	314.1 ± 298.1	330.4 ± 317.1	0.671
High sensitivity C-reactive protein, mg/L	6.9 ± 11.1	6.5 ± 10.2	7.1 ± 11.4	0.676

TP	93 (28.9)
Symmetry	
Symmetrical, n (%)	93 (100)
Left, n (%)	0 (0)
Right, n (%)	0 (0)
Location	
Incisor, n (%)	2 (2.2)
Premolar, n (%)	73 (78.5)
Molar, n (%)	18 (19.3)
Shape	
Flat, n (%)	52 (55.9)
Spindle, n (%)	21 (22.6)
Nodular, n (%)	12 (12.9)
Lobular, n (%)	8 (8.6)

Multivariate binary logistic regression analysis			
Variable	OR	95% CI	P value
Age	0.968	0.939 – 0.982	0.000***
Gender	2.305	1.374 – 3.867	0.002**
Residual glomerular filtration rate	1.023	0.794 – 1.318	0.862
Phosphate	1.411	1.110 – 1.794	0.005**
Bicarbonate	0.868	0.791 – 0.994	0.040*

Subject Characteristics. The prevalence rate of TP in this study was 28.9% (Table 1). Patients with TP were younger in age than those without [57.8 ± 10.0 vs 62.4 ± 12.3 years old; $P=0.001$], and there were more female patients with TP than their male counterparts (60.2% vs 38.0%; $P < 0.001$).

Laboratory Findings. Blood tests revealed that patients with TP had higher blood concentrations of phosphate (5.4 ± 1.1 versus 4.9 ± 1.1 mg/dL, $P = 0.001$) and lower blood concentrations of bicarbonate (20.9 ± 2.4 versus 22.0 ± 2.3 mmol/L, $P < 0.001$) than patients without TP. Although patients with TP had lower blood concentrations of the intact parathyroid hormone than patients without TP, the difference was not significant (314.1 ± 298.1 versus 330.4 ± 317.1 pg/mL, $P = 0.671$).

Clinical Findings of TPs. Oral examinations revealed that all Tps (100.0%) were symmetrical and located along the midpalatal suture (Table 2). The majority of TPs were near premolars (78.5%). Most were flatshaped (55.9%) or spindle-shaped (22.6%).

Predictors for TP. The regression analysis results are presented in Table 3. Multivariate regression modeling showed that younger age (OR 0.968; 95% CI

Conclusion

In summary, the prevalence of TP in this study was 28.9%, and the majority of patients with TP were female (60.2%). This is the first report to show that younger age, female gender, elevated blood concentration of phosphate, and decreased blood concentration of bicarbonate are predictors for TP in hemodialysis patients. Further studies will be warranted to further validate these findings. The limitations of this study small sample size and lack of torus mandibularis analysis.



論文原稿

Survey of Torus Palatinus in Patients with End-Stage Renal Disease Undergoing Hemodialysis

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Introduction

Oral tori are usually found accidentally during dental examinations. Torus palatinus (TP) develops along the midpalatal suture. The etiology of oral torus is complex and may involve environmental factors such as occlusal (biting) forces as well as genetic factors which modify the risk for developing torus. Abnormal calcium, phosphorus, and vitamin D metabolism are very common in patients with end stage renal disease and causes secondary hyperparathyroidism. Hyperparathyroidism causes the skeletal disturbances that are characteristic of renal osteodystrophy. Bony pathologies occurring in both jaw bones were found in 29.8% of the cases reviewed. Based on a study conducted in 2012, Sismans et al. reported a prevalence rate of TP (41.7%) in patients undergoing peritoneal dialysis (PD). The authors went on to propose that the higher prevalence of TP in PD patients might be attributable to renal osteodystrophy. The prevalence rates of TP in hemodialysis (23.5%) and peritoneal dialysis patients (34.3%) have also been reported by Chao et al. and Hsu et al., respectively. Therefore, the objective of this study was to examine the oral findings of a larger group of hemodialysis patients to determine the prevalence and predictors for TP in this patient population.

Method

Patients. This prospective observational study included 322 hemodialysis patients recruited from the Taoyuan branch of the Chang Gung Memorial Hospital, Taiwan, between August 2016 and December 2016. Patients were stratified into 2 groups based on the presence or absence of TP.

Diagnosis of TP. Investigations of the oral cavity consist of inspection and palpation. The shapes of TP were categorized as flat, spindle, nodular, or lobular (Figure 1). The locations of TP were near incisors, premolars, or molars.

Laboratories. Blood specimens were collected within a few days of a clinical examination that occurred during stable hemodialysis sessions to minimize the effect of any acute events.

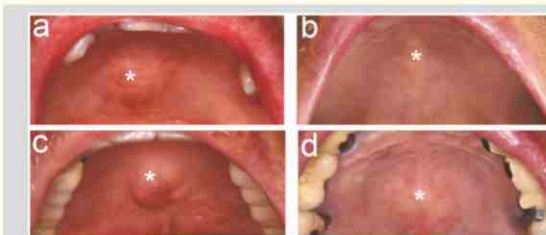


Figure 1. 4 types of torus palatinus: flat (a), spindle (b), nodular (c), and lobular (d).

Result

Subject Characteristics. The prevalence rate of TP in this study was 28.9% (Table 1). Patients with TP were younger in age than those without [57.8±10.0 vs 62.4±12.3 years old; $P=0.001$], and there were more female patients with TP than their male counterparts (60.2% vs 38.0%; $P < 0.001$).

Laboratory Findings. Blood tests revealed that patients with TP had higher blood concentrations of phosphate (5.4 ± 1.1 versus 4.9 ± 1.1 mg/dL, $P = 0.001$) and lower blood concentrations of bicarbonate (20.9 ± 2.4 versus 22.0 ± 2.3 mmol/L, $P < 0.001$) than patients without TP. Although patients with TP had lower blood concentrations of the intact parathyroid hormone than patients without TP, the difference was not significant (314.1 ± 298.1 versus 330.4 ± 317.1 pg/mL, $P = 0.671$).

Clinical Findings of TPs. Oral examinations revealed that all TPs (100.0%) were symmetrical and located along the midpalatal suture (Table 2). The majority of TPs were near premolars (78.5%). Most were flat-shaped (55.9%) or spindle-shaped (22.6%).

Predictors for TP. The regression analysis results are presented in Table 3. Multivariate regression modeling showed that younger age (OR 0.968; 95% CI 0.939–0.982; $P < 0.001$), female gender (OR 2.305; 95% CI 1.374–3.867; $P = 0.002$), higher blood concentration of phosphate (OR 1.411; 95% CI 1.110–1.794; $P = 0.005$), and lower blood concentration of bicarbonate (OR 0.868; 95% CI 0.791–0.994; $P = 0.040$) were significant predictors for TP.

Table 1. Baseline data, laboratory findings of hemodialysis patients (n = 322)

Variable	All patients (n = 322)	Patients with TP (n = 93)	Patients without TP (n = 229)	P value
Baseline characteristics				
Age, year	61.1 ± 11.8	57.8 ± 10.0	62.4 ± 12.3	0.001**
Female gender, n (%)	143 (44.4)	56 (60.2)	87 (38.0)	0.000***
Hypertension, n (%)	164 (50.9)	48 (51.6)	116 (50.7)	0.876
Diabetes mellitus, n (%)	114 (35.4)	32 (34.4)	82 (35.8)	0.812
Dialysis duration, months	107.1 ± 82.3	103.6 ± 85.2	108.6 ± 81.3	0.622
Laboratory findings				
Blood urea nitrogen, mg/dL	67.4 ± 17.7	68.9 ± 15.3	66.8 ± 18.6	0.341
Creatinine, mg/dL	10.3 ± 2.1	10.4 ± 1.9	10.3 ± 2.1	0.566
Estimated glomerular filtration rate, mL/min/1.73 m ²	4.8 ± 1.1	4.5 ± 1.1	4.8 ± 1.1	0.017*
Uric acid, mg/dL	6.7 ± 1.3	7.0 ± 1.2	6.7 ± 1.3	0.036*
Sodium, mEq/L	137.8 ± 2.8	137.7 ± 2.8	137.9 ± 2.8	0.716
Potassium, mEq/L	4.7 ± 0.7	4.8 ± 0.6	4.6 ± 0.7	0.013*
Chloride, mEq/L	99.1 ± 2.9	99.1 ± 3.1	99.1 ± 2.8	0.925
Calcium, mg/dL	9.7 ± 0.9	9.6 ± 0.9	9.7 ± 1.0	0.771
Phosphate, mg/dL	5.0 ± 1.2	5.4 ± 1.1	4.9 ± 1.1	0.001**
Bicarbonate, mmol/L	21.7 ± 2.4	20.9 ± 2.4	22.0 ± 2.3	0.000***
Fasting glucose, mg/dL	117.0 ± 53.0	114.5 ± 54.2	118.0 ± 52.6	0.596
Albumin, g/dL	4.0 ± 0.3	4.0 ± 0.3	3.9 ± 0.3	0.108
WBC, 10 ³ /uL	6.4 ± 1.9	6.8 ± 2.1	6.2 ± 1.8	0.014
RBC, 10 ⁶ /uL	3.6 ± 0.5	3.6 ± 0.5	3.6 ± 0.6	0.339
Hemoglobin, g/dL	10.4 ± 1.2	10.3 ± 1.2	10.5 ± 1.2	0.316
Hematocrit, %	32.0 ± 3.6	31.7 ± 3.5	32.1 ± 3.6	0.335
MCV, fL	89.0 ± 7.5	89.1 ± 6.5	89.0 ± 7.9	0.903
MCH, pg/Cell	29.0 ± 2.8	29.0 ± 2.5	28.9 ± 3.0	0.928
MCHC gHb/dL	32.5 ± 1.0	32.5 ± 0.9	32.5 ± 1.1	0.753
RDW, %	14.5 ± 1.4	14.4 ± 1.5	14.6 ± 1.3	0.135
Platelet count, 10 ³ /uL	184.3 ± 63.7	200.3 ± 61.8	177.8 ± 63.4	0.004**
Intact parathyroid hormone, pg/mL	325.7 ± 311.4	314.1 ± 298.1	330.4 ± 317.1	0.671
High sensitivity C-reactive protein, mg/L	6.9 ± 11.1	6.5 ± 10.2	7.1 ± 11.4	0.676

Table 2. Oral findings of TP

TP	93 (28.9)
Symmetry	
Symmetrical, n (%)	93 (100)
Left, n (%)	0 (0)
Right, n (%)	0 (0)
Location	
Incisor, n (%)	2 (2.2)
Premolar, n (%)	73 (78.5)
Molar, n (%)	18 (19.3)
Shape	
Flat, n (%)	52 (55.9)
Spindle, n (%)	21 (22.6)
Nodular, n (%)	12 (12.9)
Lobular, n (%)	8 (8.6)

Table 3. Predictors for TP in hemodialysis patients (n = 322)

Multivariate binary logistic regression analysis			
Variable	OR	95% CI	P value
Age	0.968	0.939 – 0.982	0.000***
Gender	2.305	1.374 – 3.867	0.002**
Residual glomerular filtration rate	1.023	0.794 – 1.318	0.862
Phosphate	1.411	1.110 – 1.794	0.005**
Bicarbonate	0.868	0.791 – 0.994	0.040*

Conclusion

In summary, the prevalence of TP in this study was 28.9%, and the majority of patients with TP were female (60.2%). This is the first report to show that younger age, female gender, elevated blood concentration of phosphate, and decreased blood concentration of bicarbonate are predictors for TP in hemodialysis patients. Further studies will be warranted to further validate these findings. The limitations of this study small sample size and lack of torus mandibularis analysis.