CHAPTER 4

Results

Two different finite element (FE) models were constructed. The tetrahedron elements with high mesh quality were used for discretization of the teeth, the PDL, and the alveolar bone in the models. The mesh model contained 1,315,882 nodes and 956,832 elements in model 1 and 1,930,378 nodes and 1,414,483 elements in model 2.

Von Mises stress (MPa) was calculated, which represented the distribution of stress in color coded map. Red color represented the area with maximum stress and dark blue color represented the area with minimal stress. The colors showed the stress values in range 0.00 to 0.05 MPa. The stress distribution pattern (color-coded map) on the root surface of the first molar when a distalizing force of 80 g was applied to FE model 1 is shown in Figure 4.1. On the root surface, the highest stress value was found on the cervical third of the root surface (light blue area), with the stress values decreasing towards to the apex (blue area). The stress values on the distal side of disto-buccal root and palatal root surface were higher than those on the mesial side of mesio-buccal root and palatal root surface (Table 4.1, Figure 4.2). The maximum von Mises stress value was 0.01062 N/mm² at cervical third of distal side of disto-buccal root surface. Displacement of the first molar crown and root is shown in Table 4.2 and Figure 4.3. Xaxis, the first molar crown (four cusps) moved in distal direction and the root apexes moved in mesial direction. The amount of crown movement was greater than that of root movement. Y-axis, mesial cusps (mesio-buccal cusp and mesio-palatal cusp) of the first molar moved in occlusal direction whereas distal cusps (disto-buccal cusp and disto-palatal cusp) moved in apical direction. Z-axis, mesial cusps (mesio-buccal cusp and mesio-palatal cusp) of the first molar moved in buccal direction and distal cusps (disto-buccal cusp and disto-palatal cusp) moved in palatal direction.

When a distalizing force of 80 g was applied to the first and second molars in FE model 2, the stress distribution patterns of the first and second molars are shown in

Figure 4.4. On the root surface of the first molar, the highest stress value was found on the cervical third of the root surface (light blue area) with the stress values decreasing towards to the apex (blue area). On the root surface of the second molar, the highest stress value was found on the cervical third of the root surface (sky blue area) with the stress values decreasing towards to the apex (blue area). The stress values on the distal side of root surface were higher than those on the mesial side of root surface (Table 4.3, Figure 4.5). The maximum von Mises stress value on the root surface of the first and the second molars were 0.00734 N/mm² and 0.00381 N/mm², respectively at cervical third of distal side of disto-buccal root surface. Stress values on the root surface of the second molar were less than those of the first molar. In FE model 2, the directions of the first and second molar movement were similar as the directions of the first molar (three axes) in FE model 1. The second molar showed less movement than did the first molar. The amount of distal movement of the first molar was greater than that of the second molar (Table 4.4, Figure 4.6).

The stress values and displacement of the first molar were compared between FE models 1 and 2. The stress values on the root surface of the first molar in FE model 2 were less than those in FE model 1. The amount of distal movement of the first molar in FE model 2 was less than that in FE model 1. In addition, the first molar showed greater movement when the second molar was excluded.

The stress distribution pattern (color-coded map) on the root surface of the first molar when distalizing forces of 150 g and 200 g were applied to FE model 1 is shown in Figure 4.7 and Figure 4.13, respectively. Appling the force of 150 g, the highest stress value was found on the cervical third of the root surface (erin area) with the stress values decreasing towards to the apex (blue area). Appling the force of 200 g, the highest stress value was found on the cervical third of the root surface (chartreuse area) with the stress value was found on the cervical third of the root surface (chartreuse area) with the stress value decreasing towards to the apex (blue area). The stress values on the distal side of root surface were higher than those on the mesial side of root surface. The maximum von Mises stress value on the root surface was 0.02134 N/mm² when a distalizing force of 150 g was applied (Table 4.5, Figure 4.8) and 0.02666 N/mm² when a distalizing force of 200 g was applied (Table 4.9, Figure 4.14). The directions of the first molar movement were similar as the directions of the first molar when a distalizing were similar as the directions of the first molar when a distalizing were similar as the directions of the first molar when a distalizing were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the directions of the first molar were similar as the

force of 80 g was applied. The amount of first molar movement when a distalizing force of 150 g was applied is shown in Table 4.6 and Figure 4.9, whereas that when a distalizing force of 200 g was applied is shown in Table 4.10 and Figure 4.15.

When distalizing forces of 150 g and 200 g were applied to the first and second molars in FE model 2, the stress distribution patterns of the first and second molars are shown in Figure 4.10 and Figure 4.16. When a distalizing force of 150 g was applied, the highest stress value was found on the cervical third of the root surface (aquamarine area of the first molar and blue area of the second molar) with the stress values decreasing towards to the apex (blue area on both the first and second molars). When a distalizing force of 200 g was applied, the highest stress value was found on the cervical third of the root surface (erin area of the first molar and blue area of the second molar) with the stress values decreasing towards to the apex (blue area on both the first and second molars). The maximum von Mises stress value on the first molar and the second molar when a distalizing force of 150 g was applied were 0.01584 N/mm² and 0.00612 N/mm², respectively (Table 4.7, Figure 4.11) and 0.02143 N/mm² and 0.00796 N/mm², respectively when a distalizing force of 200 g was applied (Table 4.11, Figure 4.17). The directions of the first and second molar movement were similar as the directions of the first and second molar movement when a distalizing force of 80 g was applied. The second molar showed less movement than did the first molar. The amount of distal movement of the first molar was greater than that of the second molar either when a distalizing force of 150 g (Table 4.8, Figure 4.12) or 200 g was applied (Table 4.12, Figure 4.18).

Increasing the force magnitude in the same direction increased the von Mises stress value on the root surface, and increasing the number of tooth movement with the same force magnitude decreased the von Mises stress values on the root surface (Figure 4.19). The amount of molar displacement increased with increasing force magnitude in the same direction and decreased with increasing number of tooth movement with the same force magnitude (Figure 4.20 - 4.22). The stress values and the amount of molar displacement were increased when the applied force was increased (80 g < 150 g < 200

g).



Figure 4.1 Von Mises stress distribution (color-coded map) along the root surfaces of the first molar in FE model 1 when a distalizing force of 80 g was applied.

ลิ<mark>ปสิทธิ์มหาวิทยาลัยเชียงใหม่</mark> Copyright[©] by Chiang Mai University All rights reserved

Side	Root	Part	Von Mises Stress value (N/mm ²)
		Cervical1/3	0.00892
	Magial	Middle 1/3	0.00582
	Mesiai	Apical 1/3	0.00211
Magial			>
wiesiai		Cervical1/3	0.00922
	Palatal	Middle 1/3	0.00512
		Apical 1/3	0.00192
	بيس ا		
	3	Cervical1/3	0.01062
		Middle 1/3	0.00823
2	Distal	Apical 1/3	0.00368
Distal	K	SY	
Distai		Cervical1/3	0.00856
	D 1 / 1	Middle 1/3	0.00696
	raiatal	Apical 1/3	0.00275

Table 4.1 Von Mises stress value (N/mm²) along the root surfaces of the first molar in FE model 1 when a distalizing force of 80 g was applied.



Figure 4.2 Stress value (N/mm²) on the root surface of the first molar in FE model 1 when a distalizing force of 80 g was applied.

Table 4.2 Displacement of the maxillary first molar crown and root (mm) in FE model 1 when a distalizing force of 80 g was applied: MBC, mesio-buccal cusp; DBC, distobuccal cusp; MPC, mesio-palatal cusp; DPC, disto-palatal cusp; MBRA, mesio-buccal root apex; DBRA, disto-buccal root apex; x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.

Tooth	D i		Displacement (mm)			
	Part	Position	ΔΧ	ΔΥ	ΔΖ	
		MBC	4.68E-05	8.42E-06	-1.21E-05	
	Crown	DBC	4.38E-05	-6.74E-06	3.11E-06	
First		MPC	2.66E-05	1.98E-05	-3.10E-06	
Filst		DPC	2.54E-05	-9.35E-06	6.39E-06	
mora		MBRA	-1.66E-06	6.10E-07	1.81E-07	
	Root	DBRA	-4.86E-07	-2.06E-06	8.12E-08	
		PRA	-5.45E-07	-7.22E-07	2.99E-07	



Figure 4.3 Displacement of the maxillary first molar crown and root in FE model 1 when a distalizing force of 80 g was applied: x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.



Figure 4.4 Von Mises stress distribution (color-coded map) along the root surfaces of the first molar (A) and the second molar (B) in FE model 2 when a distalizing force of 80 g was applied.

niang Mai

		First molar	a 1 9 1	91	Se	econd molar	
Side	Root	Part	Von Mises Stress value (N/mm ²)	Side	Root	Part	Von Mises Stress value (N/mm ²)
		Cervical1/3	0.00657		Magial	Cervical1/3	0.00237
	Masial	Middle 1/3	0.00314			Middle 1/3	0.00101
	wiesiai	Apical 1/3	0.00158		Wiesłał	Apical 1/3	0.00059
Masial				Masial			505
Wiesiai		Cervical1/3	0.00612	wiesiai		Cervical1/3	0.00211
	Dalatal	Middle 1/3	0.00363	1	Dalatal	Middle 1/3	0.00091
	1 alatal	Apical 1/3	0.00152		1 alatai	Apical 1/3	0.00043
0							
		Cervical1/3	0.00734	γ		Cervical1/3	0.00381
5	Distal	Middle 1/3	0.00476	3	Distal	Middle 1/3	0.00187
6	Distai	Apical 1/3	0.00223		Distai	Apical 1/3	0.00116
Distal				Distal			
Distui		Cervical1/3	0.00728	Distui		Cervical1/3	0.00378
2	Palatal	Middle 1/3	0.00533	No.	Palatal	Middle 1/3	0.00174
	i ulatal	Apical 1/3	0.00215		i ulatal	Apical 1/3	0.00103

Table 4.3 Von Mises stress value (N/mm²) along the root surfaces of the first and second molars in FE model 2 when a distalizing force of 80 g was applied.



Figure 4.5 Stress value (N/mm²) on the root surface of the first and second molars in FE model 2 when a distalizing force of 80 g was applied.

Table 4.4 Displacement of the maxillary first and second molar crowns and roots (mm) in FE model 2 a distalizing force of 80 g was applied: MBC, mesio-buccal cusp; DBC, disto-buccal cusp; MPC, mesio-palatal cusp; DPC, disto-palatal cusp; MBRA, mesiobuccal root apex; DBRA, disto-buccal root apex; x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.

			Displacement (mm)			
Tooth	Part	Position	ΔΧ	ΔΥ	ΔΖ	
		MBC	3.29E-05	5.42E-06	-1.12E-05	
	Crown	DBC	2.97E-05	-2.95E-06	1.08E-06	
	Crown	MPC	1.42E-05	4.10E-06	-2.19E-06	
First molar		DPC	1.32E-05	-3.11E-06	4.76E-06	
	Root	MBRA	-9.63E-07	8.07E-07	1.55E-07	
		DBRA	-2.56E-07	-8.81E-07	2.46E-07	
		PRA	-4.13E-07	-5.89E-08	2.28E-08	
	U	MBC	4.54E-06	7.31E-08	-4.32E-06	
	Creare	DBC	4.85E-06	-1.54E-06	-2.32E-06	
a 1	Clowii	MPC	6.53E-06	1.38E-06	-3.31E-06	
Second molar		DPC	5.99E-06	-3.05E-06	-2.14E-06	
		MBRA	-6.93E-08	8.05E-07	7.20E-08	
	Root	DBRA	-2.95E-07	-1.00E-06	2.36E-07	
		PRA	-2.90E-08	-9.88E-07	2.94E-07	



Figure 4.6 Displacement of the maxillary first and second molar crowns and roots in FE model 2 when a distalizing force of 80 g was applied: x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.



Figure 4.7 Von Mises stress distribution (color-coded map) along the root surfaces of the first molar in FE model 1 when a distalizing force of 150 g was applied.

ลิ<mark>ปสิทธิ์มหาวิทยาลัยเชียงใหม่</mark> Copyright[©] by Chiang Mai University All rights reserved

Table 4.5 Von Mises stress value (N/mm²) along the root surfaces of the first molar in FE model 1 when a distalizing force of 150 g was applied.

Side	Root	Part	Von Mises Stress value (N/mm2)
		Cervical1/3	0.01673
	Masial	Middle 1/3	0.01092
	Iviesiai	Apical 1/3	0.00378
Masial			
Iviesiai		Cervical1/3	0.01729
	Palatal	Middle 1/3	0.00845
		Apical 1/3	0.00301
		Cervical1/3	0.02134
	Dictol	Middle 1/3	0.01543
-	Distal	Apical 1/3	0.00769
Dictal	Z	S Y	
Distai		Cervical1/3	0.01904
	Palatal	Middle 1/3	0.01258
	Palatai	Apical 1/3	0.00584



Figure 4.8 Stress value (N/mm²) on the root surface of the first molar in FE model 1 when a distalizing force of 150 g was applied.

40

Table 4.6 Displacement of the maxillary first molar crown and root (mm) in FE model 1 when a distalizing force of 150 g was applied: MBC, mesio-buccal cusp; DBC, distobuccal cusp; MPC, mesio-palatal cusp; DPC, disto-palatal cusp; MBRA, mesio-buccal root apex; DBRA, disto-buccal root apex; x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.

Tooth	D (Displacement (mm)			
	Part	Position	ΔΧ	ΔΥ	ΔZ	
		MBC	8.78E-05	1.58E-05	-2.28E-05	
	Crown	DBC	8.22E-05	-1.26E-05	5.82E-06	
First		MPC	4.99E-05	4.01E-05	-7.08E-06	
FIISt		DPC	4.77E-05	-1.75E-05	1.20E-05	
mora		MBRA	-3.12E-06	1.14E-06	3.40E-07	
	Root	DBRA	-9.10E-07	-3.86E-06	1.52E-07	
		PRA	-1.02E-06	-1 35E-06	5 61E-07	



Figure 4.9 Displacement of the maxillary first molar crown and root in FE model 1 when a distalizing force of 150 g was applied: x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.

ลิ<mark>ปสิทธิ์มหาวิทยาลัยเชียงไหม</mark> Copyright[©] by Chiang Mai University All rights reserved



Figure 4.10 Von Mises stress distribution (color-coded map) along the root surfaces of the first molar (A) and the second molar (B) in FE model 2 when a distalizing force of 150 g was applied.

	First molar			91	Sec	cond molar	
Side	Root	Part	Von Mises Stress value (N/mm ²)	Side	Root	Part	Von Mises Stress value (N/mm ²)
		Cervical1/3	0.01107		Mosial	Cervical1/3	0.00445
	Mesial	Middle 1/3	0.00700	1		Middle 1/3	0.00174
	Wiesiai	Apical 1/3	0.00218		Wiesiai	Apical 1/3	0.00068
Magial			P	Magial			
wiesiai		Cervical1/3	0.01213	Wiesiai		Cervical1/3	0.00375
	Dalatal	Middle 1/3	0.00765		Palatal	Middle 1/3	0.00153
	r alatai	Apical 1/3	0.00305		r alatal	Apical 1/3	0.00071
			6	\mathcal{L}			
		Cervical1/3	0.01584			Cervical1/3	0.00612
	Distal	Middle 1/3	0.00893	S Y	Distal	Middle 1/3	0.00222
	Distai	Apical 1/3	0.00419		Distai	Apical 1/3	0.00187
Distal				Distal			t
Distai		Cervical1/3	0.01301	Dista		Cervical1/3	0.00571
	Palatal	Middle 1/3	0.00548		Palatal	Middle 1/3	0.00254
	I ulutul	Apical 1/3	0.00395		i ulutul	Apical 1/3	0.00212
			k h				

Table 4.7 Von Mises stress value (N/mm²) along the root surfaces of the first and second molars in FE model 2 when a distalizing force of 150 g was applied.



Figure 4.11 Stress value (N/mm²) on the root surface of the first and second molars in FE model 2 when a distalizing force of 150 g was applied.

Table 4.8 Displacement of the maxillary first and second molar crowns and roots (mm) in FE model 2 when a distalizing force of 150 g was applied: MBC, mesio-buccal cusp; DBC, disto-buccal cusp; MPC, mesio-palatal cusp; DPC, disto-palatal cusp; MBRA, mesio-buccal root apex; DBRA, disto-buccal root apex; x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.

				Displacement (mm	
Tooth	Part	Position	ΔΧ	ΔΥ	ΔΖ
		MBC	6.18E-05	1.02E-05	-2.11E-05
•	Crown	DBC	5.57E-05	-5.53E-06	2.02E-06
	Clowin	MPC	2.76E-05	1.46E-05	-4.12E-06
First molar		DPC	2.47E-05	-5.84E-06	8.92E-06
	Root	MBRA	-1.81E-06	1.51E-06	3.79E-07
		DBRA	-4.81E-07	-1.65E-06	3.62E-07
		PRA	-7.76E-07	-1.10E-07	4.28E-08
		MBC	8.51E-06	1.37E-06	-6.21E-06
	Course	DBC	9.10E-06	-2.88E-06	-4.35E-06
a 1	CIOWII	MPC	1.23E-05	2.58E-06	-6.02E-06
Second molar		DPC	1.12E-05	-5.72E-06	-4.01E-06
		MBRA	-1.30E-07	1.51E-06	1.35E-07
	Root	DBRA	-5.53E-07	-1.87E-06	4.42E-07
		PRA	-5.58E-08	-1.42E-06	5.51E-07



Figure 4.12 Displacement of the maxillary first and second molar crowns and roots in FE model 2 when a distalizing force of 150 g was applied: x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.



Figure 4.13 Von Mises stress distribution (color-coded map) along the root surfaces of the first molar in FE model 1 when a distalizing force of 200 g was applied.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่ Copyright[©] by Chiang Mai University All rights reserved

Table 4.9 Von Mises stress value (N/mm²) along the root surfaces of the first molar in FE model 1 when a distalizing force of 200 g was applied.

Side	Root	Part	Von Mises Stress value (N/mm2)
		Cervical1/3	0.02322
	Masial	Middle 1/3	0.01434
	Ivicsiai	Apical 1/3	0.00675
Mesial			
Westar		Cervical1/3	0.0201
	Palatal	Middle 1/3	0.01373
		Apical 1/3	0.00511
	يا لي		
		Cervical1/3	0.02666
	Distal	Middle 1/3	0.01946
	Distai	Apical 1/3	0.01028
Distal		S.Y.	
Distai		Cervical1/3	0.02576
	Palatal	Middle 1/3	0.01457
	i ulatal	Apical 1/3	0.00700



Figure 4.14 Stress value (N/mm²) on the root surface of the first molar in FE model 1 when a distalizing force of 200 g was applied.

Table 4.10 Displacement of the maxillary first molar crown and root (mm) in FE model
1 when a distalizing force of 200 g was applied: MBC, mesio-buccal cusp; DBC, distobuccal cusp; MPC, mesio-palatal cusp; DPC, disto-palatal cusp; MBRA, mesio-buccal root apex; DBRA, disto-buccal root apex; x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.

Tooth	D (Displacement (mm)			
	Part	Position	ΔΧ	ΔΥ	ΔΖ	
		MBC	1.17E-04	2.10E-05	-3.04E-05	
	Crown	DBC	1.10E-04	-1.69E-05	7.77E-05	
First		MPC	6.60E-05	5.79E-05	-2.99E-05	
Filst		DPC	6.35E-05	-2.34E-05	1.60E-05	
mora		MBRA	-4.16E-06	1.53E-06	4.53E-07	
	Root	DBRA	-1.21E-06	-5.14E-06	2.03E-07	
	-	PRA	-1.25E-06	-1.86E-06	7.54E-07	



Figure 4.15 Displacement of the maxillary first molar crown and root in FE model 1 when a distalizing force of 200 g was applied: x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.



Figure 4.16 Von Mises stress distribution (color-coded map) along the root surfaces of the first molar (A) and the second molar (B) in FE model 2 when a distalizing force of 200 g was applied.

		First molar	166		Se	cond molar	
Side	Root	Part	Von Mises Stress value (N/mm ²)	Side	Root	Part	Von Mises Stress value (N/mm ²)
		Cervical1/3	0.01716			Cervical1/3	0.00536
	Mesial	Middle 1/3	$(N/mm^2) \\ \hline (3 \\ 0.01716 \\ \hline (3 \\ 0.01208 \\ \hline (3 \\ 0.00482 \\ \hline (3 \\ 0.01460 \\ \hline (3 \\ 0.01073 \\ \hline (3 \\ 0.00402 \\ \hline (3 \\ 0.02143 \\ \hline (3 \\ 0.0214 \\ \hline (3$	Middle 1/3	0.00349		
	Iviesiai	Apical 1/3	0.00482		Wiesiai	Apical 1/3	0.00101
Mesial				Mesial			5
Wiesiai		Cervical1/3	3 0.01460 3 0.01073	Cervical1/3	0.00478		
	Palatal	Middle 1/3	0.01073		Palatal	Middle 1/3	0.00237
		Apical 1/3	0.00402		1 alatal	Apical 1/3	0.00117
2				6		Part Part Cervical1/3 Middle 1/3 Apical 1/3 Cervical1/3 Middle 1/3 Apical 1/3 Cervical1/3 Middle 1/3 Apical 1/3 Cervical1/3 Middle 1/3 Apical 1/3	
DI		Cervical1/3	0.02143			Cervical1/3	0.00796
5	Distal	Middle 1/3	0.01583		Distal	Middle 1/3	0.00462
	Distai	Apical 1/3	0.00649		Distai	Apical 1/3	0.00345
Distal				Distal			
Dista		Cervical1/3	0.01887	Distui		Cervical1/3	0.00632
P.	Palatal	Middle 1/3	Variable Von Mises Side Root Part Part Stress Side Root Pa ervical1/3 0.01716 Mesial Middl pical 1/3 0.00482 Mesial Middl ervical1/3 0.01706 Mesial Middl pical 1/3 0.01073 Mesial Middl pical 1/3 0.00402 Mesial Middl ervical1/3 0.00173 Mesial Middl pical 1/3 0.002143 Middl Apica pical 1/3 0.01583 Distal Middl pical 1/3 0.01887 Middl Apica ervical1/3 0.01545 Distal Middl pical 1/3 0.01545 Distal Middl	Middle 1/3	0.00321		
	1 unuul	Apical 1/3		I unutul	Apical 1/3	0.00280	

Table 4.11 Von Mises stress value (N/mm²) along the root surfaces of the first and second molars in FE model 2 when a distalizing force of 200 g was applied.



Figure 4.17 Stress value (N/mm²) on the root surface of the first and second molars in FE model 2 when a distalizing force of 200 g was applied.

Table 4.12 Displacement of the maxillary first and second molar crowns and roots (mm) in FE model 2 when a distalizing force of 200 g was applied: MBC, mesio-buccal cusp; DBC, disto-buccal cusp; MPC, mesio-palatal cusp; DPC, disto-palatal cusp; MBRA, mesio-buccal root apex; DBRA, disto-buccal root apex; x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.

T (1	D i	D C	Di	splacement (m	m)
Tooth	Part	Position	ΔΧ	ΔΥ	ΔΖ
		MBC	9.28E-05	1.71E-05	-2.72E-05
•	Crown	DBC	8.54E-05	-8.83E-06	1.12E-05
First	Clowin	MPC	4.18E-05	2.10E-05	-2.55E-05
First		DPC	3.98E-05	-1.39E-05	2.02E-05
inolui	Root	MBRA	-2.71E-06	8.40E-07	4.01E-07
		DBRA	-5.91E-07	-2.63E-06	4.08E-07
		PRA	-9.53E-07	-7.03E-07	6.43E-07
	U	MBC	2.11E-05	1.03E-06	-8.32E-06
	Crown	DBC	1.86E-05	-6.29E-06	-5.19E-06
Casard	CIOWII	MPC	1.83E-05	8.84E-06	-7.94E-06
Second molar		DPC	1.65E-05	-6.19E-06	-5.21E-06
monu		MBRA	-7.95E-08	1.84E-06	2.15E-07
	Root	DBRA	-6.29E-07	-2.43E-06	4.72E-07
		PRA	-5.99E-08	-1.62E-06	6.21E-07



Figure 4.18 Displacement of the maxillary first and second molar crowns and roots in FE model 2 when a distalizing force of 200 g was applied: x-axis, distal direction; y-axis, vertical direction; z-axis, lateral direction.



Figure 4.19 Maximum Von Mises stress value on the root surface when distalizing forces of 80 g, 150 g, and 200 g were applied.



Figure 4.20 Displacement of molar crown and root when a distalizing force of 80 g was applied.



Figure 4.21 Displacement of molar crown and root when a distalizing force of 150 g was applied.



Figure 4.22 Displacement of molar crown and root when a distalizing force of 200 g was applied.

<mark>ລິບສີກຣົ້ນກາວົກຍາລັຍເຮີຍວໃหນ່</mark> Copyright[©] by Chiang Mai University All rights reserved