

CHAPTER 4

RESULTS

4.1 Epidemiological study

4.1.1 Lip thicknesses from 20 cephalograms were measured, the mean thicknesses before and after bone grafting were 12.8 and 13.5 mm respectively. Mean difference of lip thickness was increased 0.7 mm after performing alveolar bone graft (Table 4.1). The maximum lip thickness increase was 3 mm and maximum decrease was 0.5 mm.

Table 4.1 Lip thicknesses before and after bone grafting.

Subject	Before (mm)	After (mm)	Average (mm)	Difference (mm)
1	6.5	6.5	6.5	0
2	15.5	15	15.25	-0.5
3	16	16	16	0
4	16.5	16.5	16.5	0
5	14.5	15	14.75	0.5
6	9.5	12.5	11	3
7	13	14	13.5	1
8	17	17.5	17.25	0.5
9	11.5	13	12.25	1.5
10	8	9	8.5	1
Mean	12.8	13.5	13.15	0.7

4.1.2 Alveolar bone height from 20 occlusal radiographs were measured. The mean different bone level decreased 34.35 percent 1 year after bone grafting. Data are shown in table 4.2. Maximum bone loss after 1 year was 103.5 % whereas minimum bone loss was 0.49 %.

Table 4.2 Percentages of bone height remaining after 1 month and 1 year after grafting.

Subject	1 month after (%)	1 year After (%)	Difference (%)
1	134.62	31.11	-103.50
2	55.56	37.29	-18.27
3	75.76	44.44	-31.31
4	48.98	46.94	-2.04
5	86.79	42.86	-43.94
6	67.39	13.33	-54.06
7	-19.51	-20.00	-0.49
8	24.00	18.00	-6.00
9	61.54	52.00	-9.54
10	107.69	33.33	-74.36
Mean	64.282	29.93	-34.35

4.1.3 Correlation analysis

After checking for data, correlation analysis shown relationship between lip thickness and grafted bone resorption percentage. Kendall's tau statistical analysis was used. Between lip thickness distance in radiographs and difference bone height were correlate at correlation efficient was 0.566 at P-value 0.025 (Table 4.3). These mean the medium power of correlation between these two factors. Graph illustrated the lesser lip thickness, the more grafted bone resorption(Figure 4.1).

Table 4.3 Correlation analysis shows relation between lip thickness and difference grafted bone resorption.

Kendall's tau-b		Lip thickness	Difference bone height
Lip thickness	Correlation Coefficient	1.000	.556*
	Sig. (2-tailed)		.025
	N	10	10
Different bone height	Correlation Coefficient	.556*	1.000
	Sig. (2-tailed)	.025	
	N	10	10

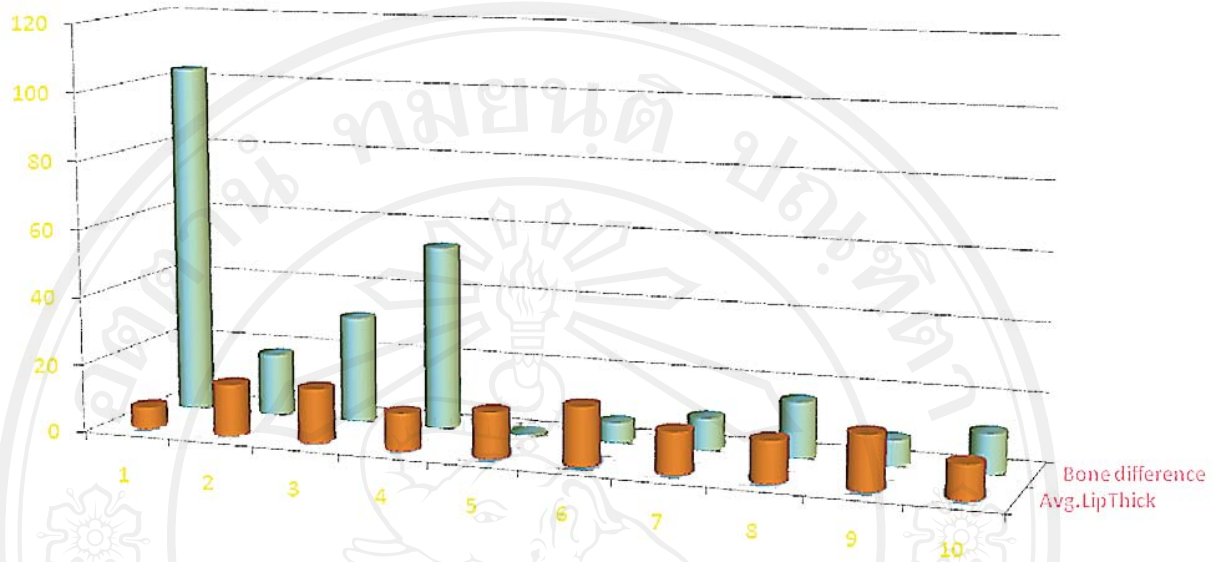
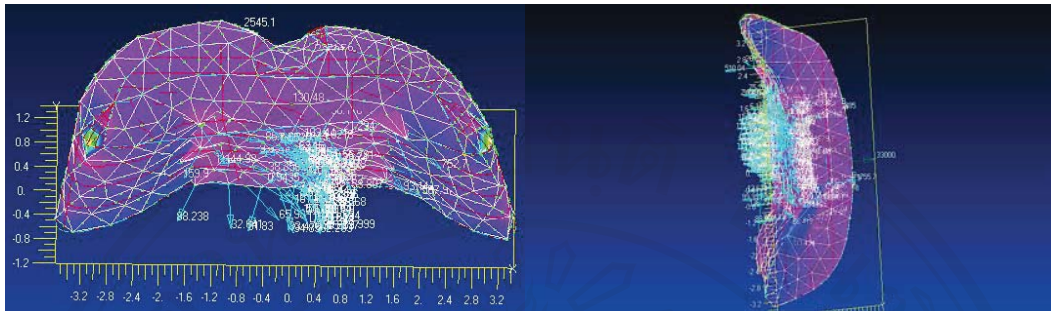


Figure 4.1 Graph demonstrated relation between lip thickness and bone height difference.

4.2 Finite element study

After apply force at the corners of lip in finite element program, The light force model that consisted of 599.02 Newton pulling the lip corner was performed by 30 degree angled to the longitudinal axis of the lip model. After running analysis, the resulting forces were cumulative aimed at the palatal side(Figure 4.2).



a)

b)

Figure 4.2 A) Analyzed model of upper lip with light force, blue arrows showed resulting force value and direction. B) Perpendicular view of the model.

Then, the result of 10 nodal forces were selected to described as force per area that pushing the maxilla model. Node 22, 24, 73, 74, 414, 601, 611, 613, 892 and 894 were selected and determined the force value occurred on them, and force value were recorded only the palatal pushing force, other direction of force were not collected. Total forces on these 10 nodes were 719.6871 Newton. The area that contained these 10 nodes were measured, the result was 1.74 square millimeter. Then, the force per area in light force model was 413.61328 Newton per square millimeter. After taken this value of force per area to the cleft maxilla model, the displacement occurred under structural analysis with maximum distance of 1.505848 mm. on node 385(Figure 4.3).

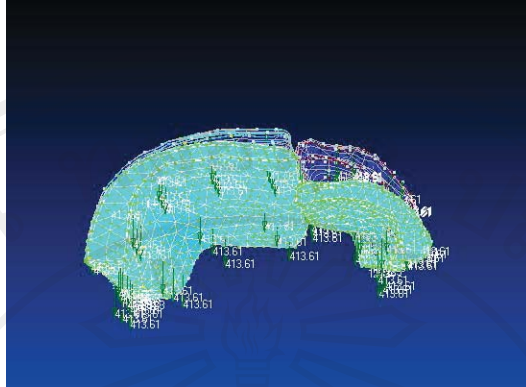


Figure 4.3 Cleft maxilla after pushing by light lip force.

The medium force lip model was analyzed under the same condition as the previous one. But the medium force contained of 1,118 Newton pulling the lip corner by 30 degree angled to the longitudinal axis of the lip model. After the structural analysis was performed, total force on 10 nodes was 870.62338 Newton. The displacement at node 210 was 0.30984 mm. with palatally direction and the output of the force per area was 500.3582644 Newton per square mm. When this value was taken to the cleft maxilla model and analyzed, the maximum displacement was 1.821663 mm. on node 385(Figure 4.4).

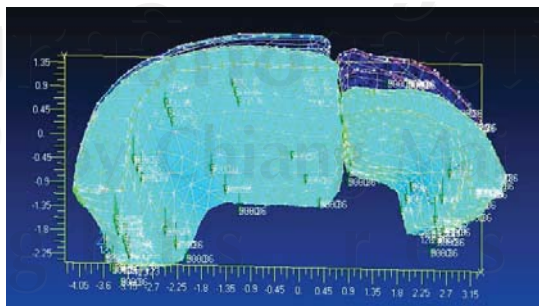


Figure 4.4 Cleft maxilla after pushing by medium lip force.

Heavy force was inserted into the same condition lip model, structural analysis was performed, total force from 10 nodes was 870.62338 Newton. 4,141.923 Newton. The displacement at node 210 was 0.94614 mm. with the same direction as others. The value of the resulting force was 2,380.415517 Newton per square mm. Then this value was taken to the cleft maxilla model and analyzed, the maximum displacement was 8.66643 mm. on node 385(Figure 4.5)

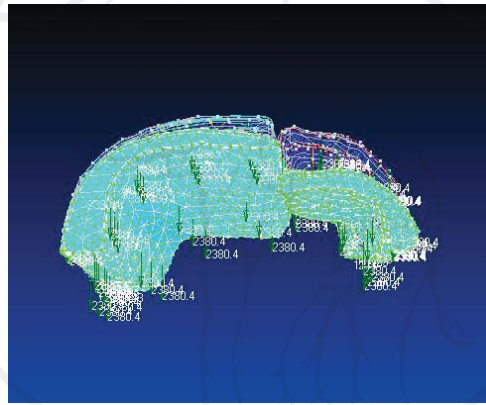


Figure 4.5 Cleft maxilla after pushing by heavy lip force.

As the results above described the light lip force had thicker lip thickness and the maxilla was displaced smaller distance than the heavy one. On the other hand, the heavy force made thinner lip thickness and also displaced larger distance than the lighter force.