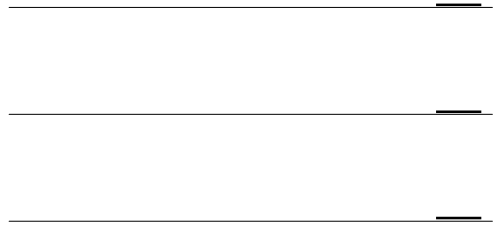


II

II

2001 7



	
	
	
I.	1
II.	5
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2.	7
3.	11
4.	13
III.	15
가.	II	
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.	II , , 6	
.	17
.	21
.	22
IV.	26

V.	33
	35
	40

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II

(Posterior

Airway Space, PAS)

(Obstructive Sleep Apnea Syndrome, OSAS)

(polysyndromic condition)

II

가

102

6

가 가

30

6

1.

II

II

(PAS(OL))

(PAS(ML), PAS(UT), H-PhW, V-PhW)

(PAS(NL),

PhW 1-PNS)

2. II , , 6
 가
 가 . (PAS (ML)) 가 가
 , (H-PhW)
 (H-PhW (Me-H))
 가 가 .
- 3.
4. 가 .
 (PAS (ML)), (PAS (Occl)),
 (PAS (UT)) (p<0.005, r=0.37 0.53)
 (PAS (ML)),
 (PAS (Occl)), (PAS (UT)) 50%
 (PAS (NL)) 13% 가
5. II
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 가 .

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II

가

52)

11

, , ,
21,22,40,41,50)

가

가

2)

19,23)

(Posterior Airway Space, PAS)

3

2,17) ,

(nasopharynx),

(oropharynx)

(hypopharynx)

(Obstructive Sleep Apnea Syndrome, OSAS)

(polysyndromic condition)

17)

가

2,24)

2-3%

10%

2,25)

(sleep apnea)

10

(sleep hypopnea)

50%

가 10

32,37)

가 7

30

, 1 5

1,2)

(respiratory disturbance index, RDI)

, RDI 10

3,4)

(central)

(obstructive)

(mixed)

3

2,3)

가

95%

37)

3.5) (cephalometry), (computed tomogram), (MRI), (polysomnography),

OSAS 가

3,16,27) Hochban¹⁵⁾ OSAS 400 155 (39%) SNB가 77° , Bacon²⁸⁾

32 OSAS 가 OSAS , II 가

가 가 가 가¹⁸⁾

가 가 , 가 가³⁷⁻³⁹⁾

가가

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54)

II

II

가

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II.

가.

I

가

ANB 0-4 ° , Wits appraisal -4.0 0mm 가 52 50

102 ,

(T0), (T1), 6 (T3) 가 가 8 ,

22 30 II (Table 1).

18 LeFort I

12

, 30 25

5 (Table 2).

Table 1. Mean Age, ANB and Wits Appraisal of Materials

Group	Sex	Sample Number	Age(years)		ANB (degree)		Wits (mm)	
			Mean	S.D.	Mean	S.D.	Mean	S.D.
Normal	Male	52	21.2	2.45	2.60	1.05	- 1.0	1.71
	Female	50	20.8	2.22	3.00	0.98	- 1.5	1.61
Class II	Male	8	27.3	3.84	6.68	1.96	3.8	2.11
	Female	22	23.3	3.72	8.70	1.84	3.9	2.87

Table 2. Classification of Class

Classification		Sample number
Surgical procedure	2- Jaw surgery (Mx+Mn)	18
	1- Jaw surgery (Mn)	12
Genioplasty	with genioplasty	25
	without genioplasty	5

1.

1.5 m

cephalostat

(Orthophos CD[®], Siemens,

Germany),

0.003

2

0.3 mm

2

(paired *t*-test)

(2- sample *t*-test)

가

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1

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2

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6

1

.

(SummaSketch[®]III, Summagraphics, USA)

2.

(Fig. 1, 2)

S	Sella	Midpoint of fossa hypophysealis
N	Nasion	Anterior point at frontonasal suture
O	Orbitale	Most inferior point of the orbit
ANS	Spina nasalis ant.	Most anterior point of anterior nasal spine
PNS	Spina nasalis post.	Most posterior point of hard palate
A	A-point	Deepest anterior point in concavity of anterior maxilla
B	B-point	Deepest anterior point in concavity of anterior mandible
Pg	Pogonion	Most anterior point of bony chin
Me	Menton	Most inferior point of bony chin
Go	Gonion	A mid-plane point at the gonial angle located by bisecting the posterior and inferior borders of the mandible
Ar	Articulare	A mid-plane point at the intersection of posterior ramus with inferior cranial base
Ba	Basion	Most inferior point on anterior foramen magnum
Po	Porion	Most superior point of bony external auditory meatus
PhW1		Ba-PNS bisecting posterior pharyngeal wall
PhW2		ANS-PNS bisecting posterior pharyngeal wall
PhW3		Occlusal plane bisecting posterior pharyngeal wall
PhW4		Mandibular plane bisecting posterior pharyngeal wall
PhW5		Me-H bisecting posterior pharyngeal wall
PhWUT		Shortest distance point of posterior pharyngeal wall from UT
PhWV		Shortest distance point of posterior pharyngeal wall from V
PhWH		Shortest distance point of posterior pharyngeal wall from H
H	Hyoid	Most antero-superior point of hyoid
V	Vallecula	Most antero-inferior point of epiglottic fold
T1	Tongue base	ML-bisecting posterior margin of the tongue base
T2	Back of tongue	Most superior point of the back of the tongue to V-TT
T3		Occlusal plane bisecting posterior margin of the tongue
TT	Tongue tip	Most anterior point of the tip of the tongue
U1		Most superior point of soft palate distal to PNS
U2		Posterior margin of soft palate at its greatest thickness
U3		Occlusal plane bisecting posterior margin of soft palate
UT	Uvula tip	Tip of uvula or soft palate
U4		Anterior margin of soft palate at its greatest thickness
U5		Most antero-superior margin of the soft palate
AA	Anterior atlas	Most anterior point of bony atlas

Fig. 1-1 Landmarks

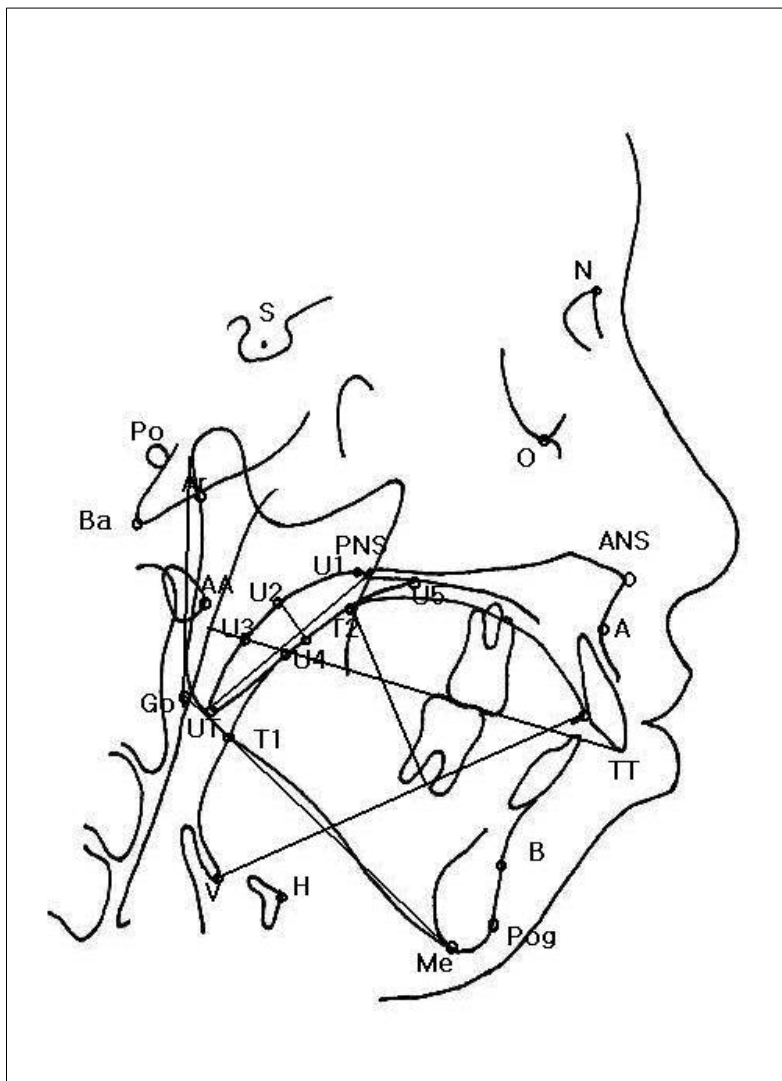
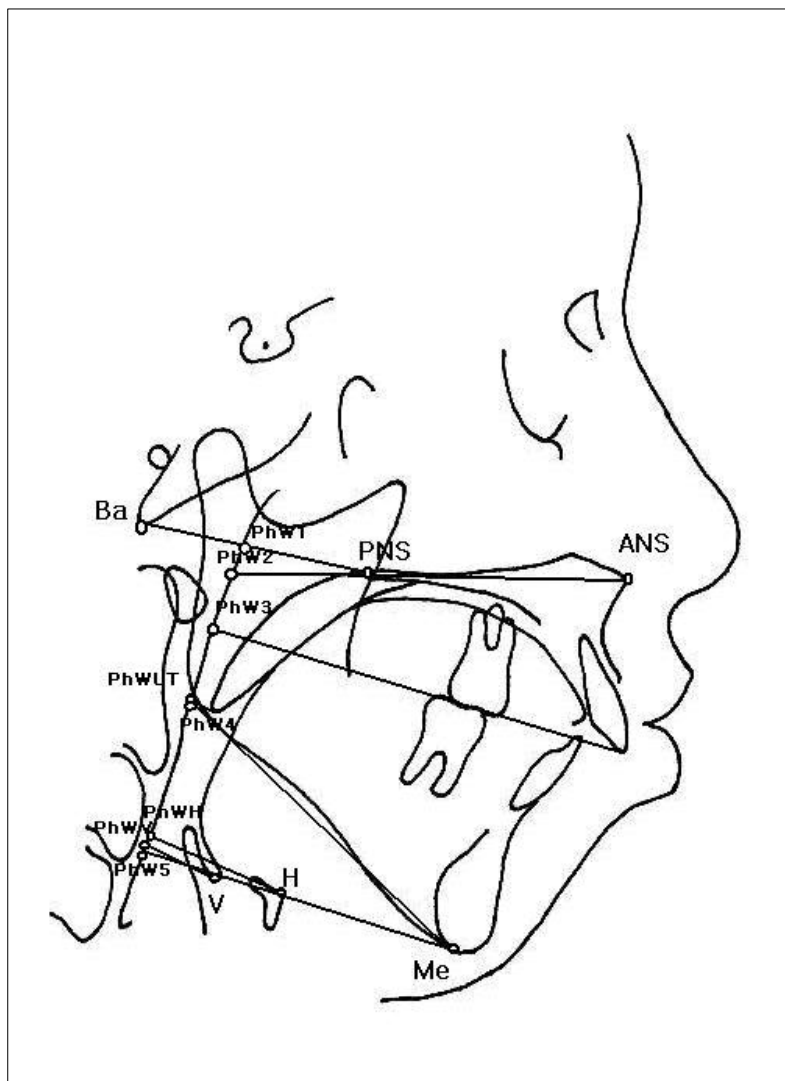
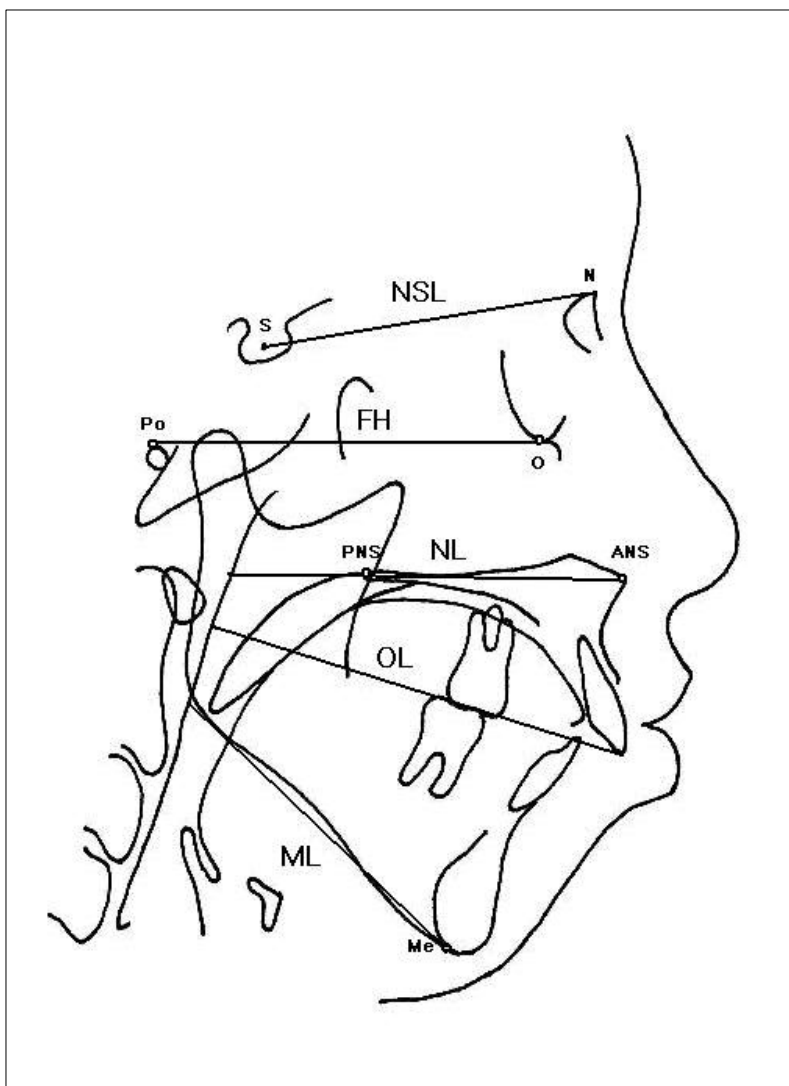


Fig. 1-2 Landmarks (PAS)



NSL	Nasion-Sella line
NL	Nasal line (ANS-PNS)
ML	Mandibular line (Me-Go)
FH	Frankfort Horizontal line (O-Po)
OL	Occlusal line

Fig. 2 Reference lines



3.

1)

PAS (ML)	Distance posterior pharyngeal wall-tongue base on ML(PhW4-T1)
PAS (OL)	Distance posterior pharyngeal wall-tongue base on occlusal plane(PhW3-T3)
PAS (NL)	Distance posterior pharyngeal wall-PNS on NL(PhW2-PNS)
PAS (UT)	Distance posterior pharyngeal wall-uvula tip(PhWUT - UT)
AA-PNS	Distance anterior atlas-posterior nasal spine
Ba-PNS	Distance basion-posterior nasal spine
Ba-PhW1	Distance basion-posterior pharyngeal wall on Ba-PNS
PhW1-PNS (PAS)	Distance posterior pharyngeal wall-PNS on Ba-PNS
Go-PNS	Posterior lower facial height
Ba-A	Distance basion-point A
PNS-UT	Length of the soft palate (uvula-length)
U2-U4	Thickness of the soft palate (uvula-thickness)
V-Me	Distance vallecula-menton
V-ANS	Distance vallecula-anterior nasal spine
V-S	Distance vallecula-sella
T1-ANS	Distance tongue base-anterior nasal spine
T1-B	Distance tongue base-point B
T1-PNS	Distance tongue base-posterior nasal spine
T1-TT	Distance tongue base-tongue tip
V-PhW (PAS)	Shortest distance V-posterior pharyngeal wall(PhWV-V)
V-TT	Axis of the tongue tip
T2/V-TT	Tongue height
H-ML	Shortest distance hyoid to mandibular plane
H-Me	Distance hyoid-menton
H-B	Distance hyoid-point B
H-PhW (Me-H)	Distance hyoid-posterior pharyngeal wall on Me-H((PhW5-H)
H-PhW(PAS)	Shortest distance hyoid to posterior pharyngeal wall(PhWH-H)
AA-H	Distance hyoid-anterior atlas
H-S	Distance hyoid-sella

2)

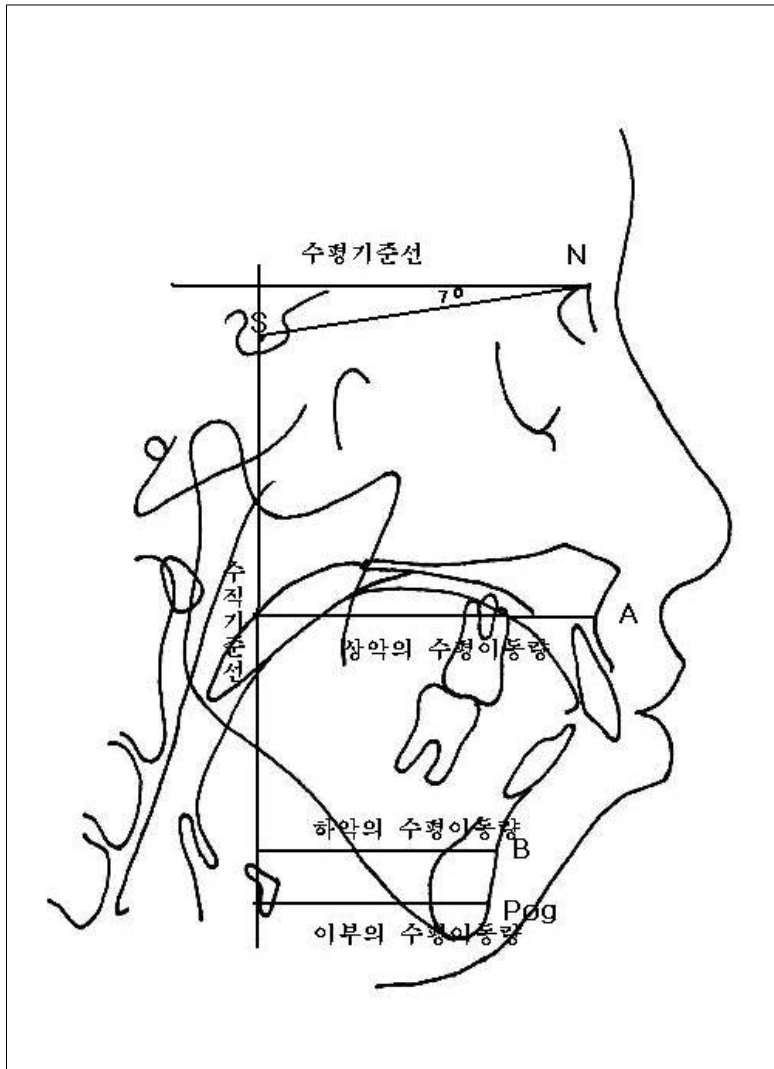
SNA	Angle between S-N and N-A
SNB	Angle between S-N and N-B
V-TT/ML	Angle between V-TT and ML
V-TT/FH	Angle between V-TT and FH
N-S-H	Angle between N-S and S-H
NSL/Ar-H	Angle between NSL and Ar-H
ML/H	Angle between Go-Me-H
Uvular Angulation	Angle between NL and PNS-UT

3)

(Fig. 3)

-	(Hor/A) : Sella	SN line	7
		A point	
-	(Hor/B) : Sella	SN line	7
		B point	
-	(Hor/Pog) : Sella	SN line	7
		Pogonion	

Fig. 3 Measurements of the hard tissue changes



4.

II

6

SAS (version 6.04, SAS Institutes, Cary, NC, USA)

II

II

t-test , , 6 paired
5% .
, 6 A
point, B point, Pogonion , 가 .
Pearson
가 .

III.

가.

II

(Table 3)

	II		
PAS (ML), PAS (UT)		II	
(p=0.0013, 0.0002),			V - PhW, H - PhW
	PAS (OL)		II
가		PAS (NL)	PhW 1 - PNS
가		. (p=0.0000, 0.0000).	
(Uvula length)	II	가	(p=0.0003)
(Uvula thickness)	II		(p=0.0000).
	II	가	H - ML
(p=0.0390) AA - H	H - S	(p=0.0001, p=0.0310),	
	N - S - H, NSL / Ar - H	II	가
		II	

Table 3. Analysis of pharyngeal dimensions : Normal vs Class

Measurements	Normal (<i>N</i> = 102)		Class (<i>N</i> = 30)		p- value
	Mean	(SD)	Mean	(SD)	
PAS (ML)	12.52	(3.26)	10.53	(3.09)	0.0013
PAS (OL)	18.77	(3.17)	18.00	(3.20)	0.1955
PAS (NL)	28.17	(2.99)	30.86	(3.53)	0.0000
PAS (UT)	11.32	(2.85)	9.30	(2.93)	0.0002
AA- PNS	35.04	(3.44)	37.50	(3.57)	0.0002
Ba- PNS	48.35	(3.86)	48.40	(4.19)	0.9475
Ba- PhW l	20.76	(3.02)	18.53	(2.68)	0.0001
PhW l- PNS (PAS)	27.59	(2.83)	29.86	(3.43)	0.0000
Go- PNS	53.84	(4.76)	51.06	(7.47)	0.0535
Ba- A	97.45	(5.50)	93.26	(5.68)	0.0001
PNS- UT	35.69	(3.69)	38.30	(4.31)	0.0003
U2- U4	10.20	(1.81)	8.63	(1.54)	0.0000
Uvula- angulation °	127.80	(5.09)	136.90	(6.24)	0.0000
V- Me	58.94	(5.63)	50.36	(7.38)	0.0001
V- ANS	95.07	(5.70)	99.03	(5.88)	0.0003
V- S	109.15	(8.33)	107.83	(8.28)	0.4027
T 1- ANS	88.09	(5.25)	86.83	(5.68)	0.2089
T 1- B	68.30	(4.39)	62.06	(4.41)	0.0000
T 1- PNS	51.66	(4.28)	49.20	(6.33)	0.0444
T 1- TT	72.28	(5.08)	70.53	(5.15)	0.0689
V- PhW (PAS)	17.00	(3.96)	15.40	(3.25)	0.0307
V- TT	75.10	(5.52)	77.10	(5.26)	0.0558
T 2/ V- TT	36.78	(3.37)	35.86	(3.52)	0.1507
V- TT/ML °	50.42	(5.88)	60.13	(8.48)	0.0001
V- TT/FH °	26.37	(5.09)	25.03	(5.95)	0.2362
H- ML	8.96	(4.56)	11.43	(6.14)	0.0390
H- Me	43.24	(4.90)	35.93	(6.51)	0.0001
H- B	50.84	(4.78)	46.36	(5.18)	0.0000
H- PhW (Me- H)	33.23	(4.56)	30.16	(3.83)	0.0004
H- PhW (PAS)	32.69	(4.44)	29.66	(3.89)	0.0003
AA- H	65.38	(7.18)	60.00	(7.18)	0.0001
H- S	112.04	(8.50)	108.56	(8.31)	0.0310
N- S- H °	90.41	(3.89)	95.26	(5.23)	0.0001
NSL/ Ar- H °	75.24	(4.41)	83.16	(7.90)	0.0001
ML/ H °	12.15	(6.52)	19.50	(11.31)	0.0014

° = degree, others = mm,

. II , , 6

(Table 4, 5)

1.

PAS (NL) , 가
 , PhW 1-PNS
 가
 (p=0.0402).
 PAS (OL) 3.73mm 가
 (p=0.0001), 6
 가 (p=0.0001). PAS (ML) PAS (UT)
 가 6
 가
 H- PhW , H- PhW (Me- H) 가
 가 6
 가 (p=0.0003, 0.0112). V- PhW
 가 가 6
 (p=0.0230).

2.

H-ML, AA-H, H-S
 가 6
 N-S-H, NSL/Ar-H 가 6
 (p=0.0002, p=0.0001), H-Me 가
 가 6 (p=0.0001).

Table 4. Pharyngeal dimensions of pre-operation, immediate post-operation and follow-up periods(6 months) in Class II

Measurements	T0		T1		T2	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
PAS (ML)	10.53	(3.09)	14.10	(4.96)	13.70	(3.46)
PAS (OL)	18.00	(3.20)	21.76	(3.48)	20.76	(3.65)
PAS (NL)	30.86	(3.53)	30.96	(3.02)	31.43	(3.27)
PAS (UT)	9.30	(2.93)	11.80	(3.80)	11.50	(3.02)
AA-PNS	37.50	(3.57)	38.56	(3.34)	38.50	(3.38)
Ba-PNS	48.40	(4.19)	49.00	(3.65)	49.16	(3.86)
Ba-PhW1	18.53	(2.68)	18.70	(2.40)	18.43	(3.15)
PhW1-PNS (PAS)	29.86	(3.43)	30.26	(2.76)	30.66	(3.36)
Go-PNS	51.06	(7.47)	49.33	(6.54)	47.86	(7.24)
Ba-A	93.26	(5.68)	93.23	(5.76)	93.30	(5.65)
PNS-UT	38.30	(4.31)	38.50	(3.39)	36.63	(2.78)
U2-U4	8.63	(1.54)	9.43	(1.95)	8.56	(1.52)
Uvula-angulation °	136.90	(6.24)	131.70	(5.89)	134.83	(6.05)
V-Me	50.36	(7.38)	59.80	(5.70)	57.33	(6.22)
V-ANS	99.03	(5.88)	97.46	(6.07)	95.90	(5.43)
V-S	107.83	(8.28)	106.90	(8.01)	105.20	(8.75)
T1-ANS	86.83	(5.68)	83.73	(5.69)	83.36	(6.15)
T1-B	62.06	(4.41)	64.16	(4.50)	64.10	(4.80)
T1-PNS	49.20	(6.33)	48.16	(6.06)	46.80	(6.82)
T1-TT	70.53	(5.15)	68.73	(6.30)	68.80	(5.15)
V-PhW (PAS)	15.40	(3.25)	16.73	(5.46)	16.43	(3.37)
V-TT	77.10	(5.26)	76.53	(6.55)	75.03	(5.95)
T2/V-TT	35.86	(3.52)	34.86	(3.75)	35.80	(3.88)
V-TT/ML °	60.13	(8.48)	57.73	(7.38)	58.73	(7.89)
V-TT/FH °	25.03	(5.95)	24.20	(6.19)	23.16	(5.84)
H-ML	11.43	(6.14)	17.53	(8.65)	11.56	(6.22)
H-Me	35.93	(6.51)	44.06	(4.91)	43.36	(5.00)
H-B	46.36	(5.18)	51.00	(6.77)	48.50	(4.26)
H-PhW (Me-H)	30.16	(3.83)	34.20	(5.80)	31.10	(4.38)
H-PhW (PAS)	29.66	(3.89)	33.33	(4.84)	30.70	(4.12)
AA-H	60.00	(7.18)	66.40	(7.15)	59.03	(7.40)
H-S	108.56	(8.31)	114.10	(9.10)	106.56	(8.12)
N-S-H °	95.26	(5.23)	93.26	(5.24)	93.26	(5.11)
NSL/Ar-H °	83.16	(7.90)	80.96	(7.94)	80.23	(7.97)
ML/H °	19.50	(11.31)	23.73	(11.73)	16.10	(9.10)

°= degree, others= mm,

T0=pre-operative, T1=post-operative, T2=follow-up

Table 5. Changes of pharyngeal dimensions of pre-operation, immediate post-operation and follow-up periods in Class II and significance test

Measurements	T1-T0			T2-T0			T2-T1		
	mean	(SD)	p-value	mean	(SD)	p-value	mean	(SD)	p-value
PAS (ML)	3.56	(3.82)	0.0001	3.13	(3.35)	0.0001	-0.43	(4.10)	0.5678
PAS (OL)	3.73	(3.55)	0.0001	2.82	(3.15)	0.0001	-0.91	(2.32)	0.0390
PAS (NL)	0.10	(2.70)	0.8285	0.56	(2.06)	0.1437	0.45	(2.15)	0.2539
PAS (UT)	2.60	(2.91)	0.0001	2.33	(2.37)	0.0001	-0.27	(2.85)	0.6022
AA-PNS	1.09	(2.29)	0.0140	0.97	(1.81)	0.0064	-0.12	(1.99)	0.7372
Ba-PNS	0.68	(2.55)	0.1515	0.78	(2.06)	0.0471	0.09	(1.48)	0.7287
Ba-PhW1	0.31	(1.77)	0.3441	-0.35	(1.60)	0.2366	-0.35	(1.60)	0.2366
PhW1-PNS (PAS)	0.37	(2.42)	0.4018	0.79	(2.01)	0.0402	0.41	(2.02)	0.2712
Go-PNS	-1.68	(2.54)	0.0011	-3.17	(2.16)	0.0001	-1.48	(2.14)	0.0007
Ba-A	-0.04	(3.05)	0.9326	0.07	(3.33)	0.9049	0.12	(1.50)	0.6640
PNS-UT	0.12	(4.22)	0.8770	-1.70	(3.62)	0.0152	-1.82	(3.25)	0.0045
U2-U4	0.82	(1.43)	0.0037	-0.05	(1.20)	0.7938	-0.88	(1.40)	0.0017
Uvula-angulation °	-5.27	(5.56)	0.0001	-2.10	(5.55)	0.0468	3.16	(4.45)	0.0005
V-Me	9.58	(6.53)	0.0001	7.04	(5.00)	0.0001	-2.54	(4.74)	0.0065
V-ANS	-1.45	(3.73)	0.0421	-3.06	(4.12)	0.0003	-1.61	(4.34)	0.0515
V-S	-1.01	(3.57)	0.1317	-2.55	(3.84)	0.0011	-1.54	(3.78)	0.0336
T1-ANS	-3.09	(2.05)	0.0001	-3.39	(2.86)	0.0001	-0.30	(2.64)	0.5392
T1-B	2.16	(3.39)	0.0016	2.13	(3.33)	0.0015	-0.02	(3.62)	0.9703
T1-PNS	-0.99	(2.24)	0.0211	-2.34	(2.01)	0.0001	-1.34	(1.98)	0.0009
T1-TT	-1.72	(5.55)	0.0992	-1.67	(4.94)	0.0740	0.05	(6.96)	0.9661
V-PhW (PAS)	1.38	(3.52)	0.0403	1.06	(2.44)	0.0230	-0.31	(4.46)	0.7038
V-TT	-0.44	(6.11)	0.6910	-2.10	(4.76)	0.0219	-1.66	(7.33)	0.2250
T2/V-TT	-1.04	(2.93)	0.0598	-0.01	(2.89)	0.9748	1.03	(3.18)	0.0866
V-TT/ML °	-2.46	(4.07)	0.0025	-1.44	(3.81)	0.0474	1.02	(4.35)	0.2082
V-TT/FH °	-0.77	(3.69)	0.2620	-1.79	(4.38)	0.0327	-1.02	(4.00)	0.2133
H-ML	6.07	(6.27)	0.0001	0.22	(3.76)	0.7470	-5.85	(5.48)	0.0001
H-Me	8.07	(5.18)	0.0001	7.34	(5.69)	0.0001	-0.72	(4.37)	0.3712
H-B	4.60	(4.45)	0.0001	2.08	(3.78)	0.0052	-2.51	(4.65)	0.0060
H-PhW (Me-H)	4.02	(4.30)	0.0001	0.94	(1.91)	0.0112	-3.07	(4.31)	0.0005
H-PhW (PAS)	3.79	(3.30)	0.0001	1.10	(1.46)	0.0003	-2.68	(3.35)	0.0001
AA-H	6.37	(6.06)	0.0001	-1.01	(3.79)	0.1539	-7.39	(5.64)	0.0001
H-S	5.53	(6.93)	0.0001	-1.99	(3.72)	0.0066	-7.52	(6.29)	0.0001
N-S-H °	-1.98	(2.33)	0.0001	-1.98	(2.51)	0.0002	-0.00	(2.16)	0.9962
NSL/Ar-H °	-2.10	(4.19)	0.0103	-2.87	(3.28)	0.0001	-0.77	(3.46)	0.2319
ML/H °	4.27	(8.91)	0.0136	-3.44	(5.99)	0.0038	-7.71	(7.12)	0.0001

° = degree, others = mm,

T0=pre-operative, T1=post-operative, T2=follow-up

1.

(Table 6)

6

Table 6. Changes of pharyngeal dimensions after 1-jaw and 2-jaw surgery and significance test

Measurements	T2-T0				p- value
	1-jaw (N =12)		2-jaw (N = 18)		
	Mean	(SD)	Mean	(SD)	
PAS (ML)	2.70	(2.30)	3.41	(3.95)	0.5777
PAS (OL)	2.24	(1.28)	3.20	(3.94)	0.3449
PAS (NL)	0.40	(1.48)	0.67	(2.40)	0.7308
PAS (UT)	1.90	(1.16)	2.61	(2.92)	0.3617
PhW1-PNS (PAS)	0.34	(1.56)	1.08	(2.26)	0.3340
V-PhW (PAS)	0.62	(1.56)	1.36	(2.88)	0.3718
H-PhW (Me-H)	0.87	(1.23)	0.99	(2.30)	0.8499
H-PhW(PAS)	1.21	(1.25)	1.03	(1.61)	0.7449

unit=mm

T0=pre- operative, T1=post- operative, T2=follow - up

2.

(Table 7)

PAS PhW1-PNS
(p=0.0001).

Table 7. Changes of pharyngeal dimensions after surgery with genioplasty and without genioplasty and significance test

Measurements	T2-T0				p-value
	without genioplasty (N =5)		with genioplasty (N =25)		
	Mean	(SD)	Mean	(SD)	
PAS (ML)	2.95	(1.99)	3.16	(3.60)	0.9005
PAS (OL)	1.41	(3.01)	3.10	(3.17)	0.2819
PAS (NL)	-0.49	(0.75)	0.77	(2.18)	0.2123
PAS (UT)	1.12	(2.44)	2.57	(2.34)	0.2204
PhW I-PNS (PAS)	-0.73	(0.40)	1.09	(2.07)	0.0004
V-PhW (PAS)	0.50	(1.74)	1.18	(2.57)	0.5780
H-PhW (Me-H)	1.39	(1.74)	0.85	(1.97)	0.5785
H-PhW(PAS)	1.70	(1.73)	0.98	(1.41)	0.3221

unit= mm,

T0=pre-operative, T1=post-operative, T2=follow-up

11) (Table 8, 9, 10,

(A), (B), (Pog)
 6 PAS
 5% Pearson (Table 8, 9, 10).
 가
 가
 PAS (ML) (Hor/A, Hor/B, Hor/Pog)
 , PAS (UT) (Hor/B) (Hor/Pog)
 . PAS (OL) 가
 가 PAS (NL), V-PhW, H-PhW
 가

Table 8 . Horizontal A, B and Pogonion dimensions in Class II before operation, after operation and during follow-up period

Measurements	T0		T1		T2	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Hor/A	61.13	(3.77)	61.56	(2.73)	60.45	(2.81)
Hor/B	41.00	(3.32)	46.51	(3.47)	44.3	(4.41)
Hor/Pog	39.16	(3.11)	50.43	(4.08)	46.90	(3.87)

°= degree, unit= mm,

T0=pre- operative, T1=post- operative, T2=follow- up

Table 9. Changes of Horizontal A, B and Pogonion dimensions after surgery and significance test

Measurements	T1-T0			T2-T0			T2-T1		
	means	(SD)	p- value	means	(SD)	p- value	means	(SD)	p- value
Hor/A	0.39	(2.67)	0.4460	0.62	(3.05)	0.3018	0.22	(1.21)	0.3524
Hor/B	7.44	(4.17)	0.0001	6.28	(4.21)	0.0001	- 1.15	(2.06)	0.0074
Hor/Pog	12.29	(5.96)	0.0001	10.32	(4.91)	0.0001	- 1.96	(2.52)	0.0004

°= degree, unit= mm,

T0=pre- operative, T1=post- operative, T2=follow- up

Table 10. Correlation analysis between changes of pharyngeal dimensions and maxillomandibular movements (T2-T0) and significance test

Variables	T2-T0					
	Hor/A		Hor/B		Hor/Pog	
	correlation coefficient	p-value	correlation coefficient	p-value	correlation coefficient	p-value
PAS (ML)	0.46378	0.0098	0.52805	0.0027	0.37514	0.0411
PAS (OL)	0.39574	0.0304	0.37134	0.0433	0.33533	0.0701
PAS (NL)	-0.0400	0.8335	-0.02056	0.9144	0.08345	0.6611
PAS(UT)	0.27044	0.1483	0.52922	0.0026	0.51424	0.0036
V-PhW	0.12459	0.5118	0.18824	0.3192	0.19958	0.2903
H-PhW	0.31194	0.0933	0.31839	0.0864	0.06481	0.7337

Pearson correlation coefficient. significant at the level of $p < 0.05$

T0=pre-operative, T1=post-operative, T2=follow-up

PAS

stepwise

(Table 11).

PAS

PAS(ML), PAS(OL), PAS(UT)

50%

PAS(NL)

13%

가

.

Table 11. Multiple regression analysis of PAS (T2-T0)

T2-T0		p- value	R ²	Regression Equation(T2- T0)
Dependent variables	Independent variables			
PAS (ML)	Hor/B	0.0001	61.33	PAS(ML)=0.48889652 × Hor/ B
PAS (OL)	Hor/Pog	0.0001	51.79	PAS(Occ1)=0.27477691 × Hor/ Pog
PAS (NL)	Hor/Pog	0.0508	13.89	PAS(NL)=0.06742107 × Hor/ Pog
PAS(UT)	Hor/Pog	0.0001	67.99	PAS(UT)=0.24449862 × Hor/ Pog
V-PhW	Hor/Pog	0.0203	19.02	V- PhW=0.10335533 × Hor/Pog
H-PhW	Hor/B	0.0002	42.66	H- PhW=0.16158590 × Hor/ B

: stepwise, p- value : 15%, R²=%

T0=pre- operative, T1=post- operative, T2=follow -up

IV.

II

가

가

가

5,37)

Riley ³⁾

가

3 가가 가

가

Riley ^{3,29)} 19

3

가

가

37)

38,39)

가 .

가

54)

5), 가 ,

가

37)

가

5,10 - 15,37 - 39)

44 - 52)

37 - 39)가

53)

Hochban 15)

II

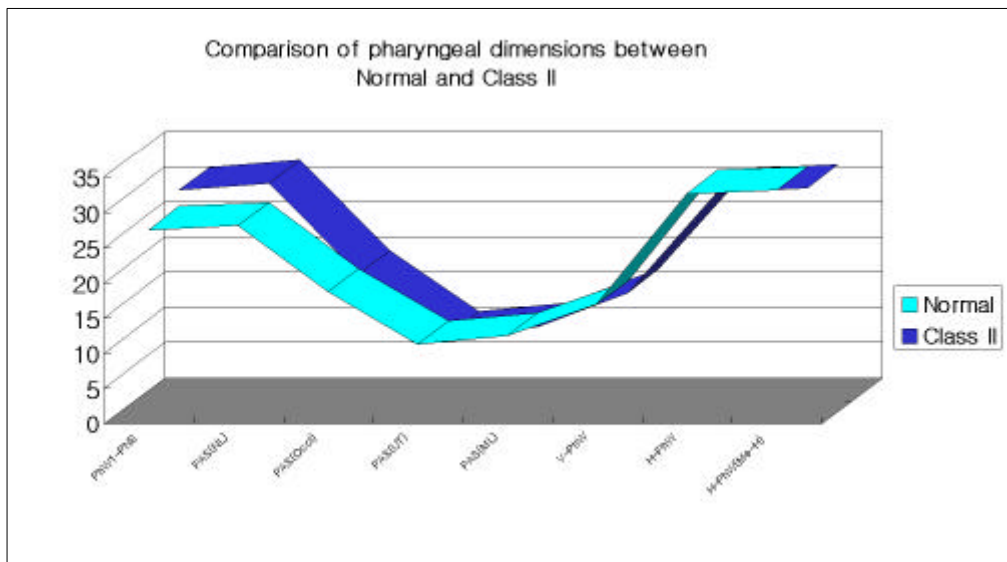
II

가 .

21),

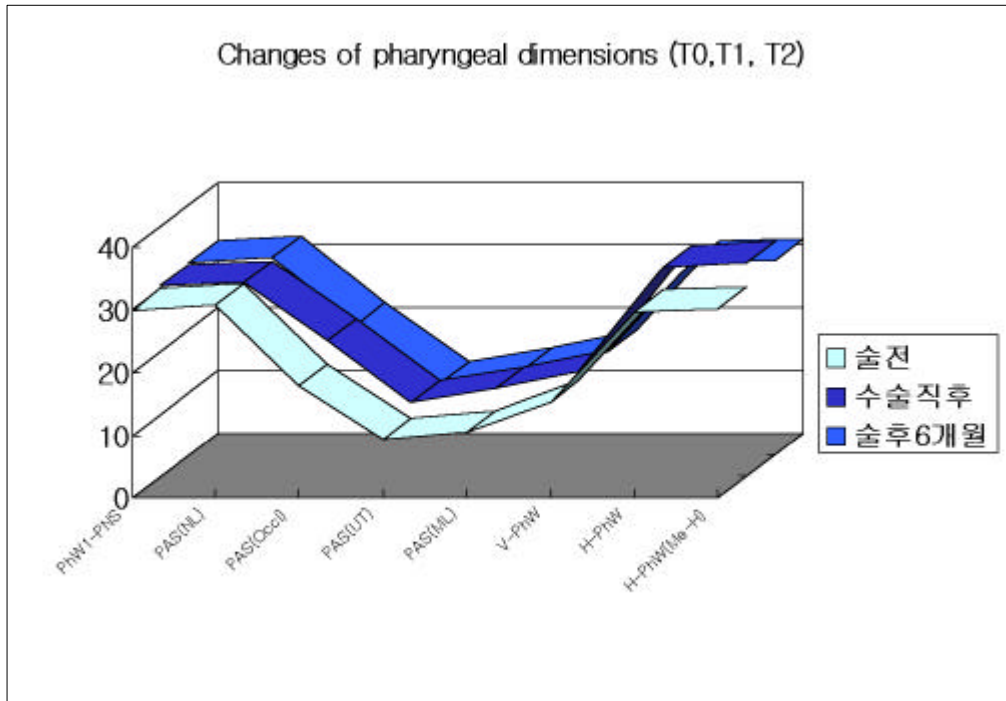
II

PAS(OL)
 , (PAS-UT, PAS-ML) (V-PhW)
 PAS
 2) (PAS-NL)
 가



PAS(NL), PhW 1-PNS
 가 PAS(ML), PAS(UT)
 가
 가
 ,
 , U 가 가
 6)

H-PhW, H-PhW (Me-H) 가
 가 가



가 가 6

20,32)

가 가

Ba-PhW 1 2

Abu A. Joseph (7,34)

2). Hockban¹⁵⁾, Waite⁶⁾ II

가

6,7,34)

II

Schudel, Wolford,

and Epker^{19,35)}

Waite⁶⁾

가

가 가

가

6

Waite⁸⁾

가가

가

가

가

18,30,31)

De Ponte FS¹⁷⁾

II

가

30)

가

PhW 1-PNS

가 (p=0.0004),

5

4

가

가

가

가

가

16)

가

6.7, 16 - 19)

6)

5% Pearson

stepwise

15%

PAS (ML)

(Hor/ A, Hor/B, Hor/Pog)

, PAS (UT)

(Hor/B)

(Hor/Pog)

. PAS (OL)

PAS(NL), V-PhW, H-PhW

PAS

PAS(ML), PAS(OL), PAS(UT)

50%

PAS(NL) 13% 가

가

가

가

가

V.

II

102

30 6 가 가 8 , 22
 , , 6
 .

1. II II
 (PAS(OL))
 (PAS(ML), PAS(UT), H-PhW, V-PhW) , (PAS(NL),
 PhW 1-PNS)

2. II , , 6
 가
 가 (PAS(ML)) 가 가
 , (H-PhW)
 (H-PhW(Me-H))
 가 가 .

3. 가 .

4. (PAS(ML)), (PAS(Occl)),
 (PAS(UT)) (p<0.005, r=0.37 0.53)
 (PAS(ML)),

(PAS (Occl)),

(PAS (UT))

50%

(PAS (NL))

13%

가

5.

II

6

II

가

가

가

VI.

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ABSTRACT

Cephalometric study of posterior airway space and hyoid bone position in patients affected by class malocclusion and treated with orthognathic surgery

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OSAS (obstructive sleep apnea syndrome) is becoming more and more of importance nowadays. Therefore the study concerning OSAS is very important. Most of the studies which have been reported were comparison of upper airway size and change of skeletal class group and skeletal class group respectively. But, most of the showing OSAS have pharyngeal narrowing combined with more or less distinct maxillary and mandibular deficiency.

Therefore the aim of this study is to analyse cephalometric characteristics of skeletal class group in order to see whether certain craniofacial characteristics exist compared to skeletal class group and see posterior airway space and hyoid bone position in patients affected by class malocclusion and treated with orthognathic surgery.

At first, we measured the lines between selected upper air way landmarks on lateral cephalometric x-ray films of skeletal class 102 persons and did the same lines of landmarks of skeletal class 30 persons who had not been operated yet, were within 2 weeks after operation, were 6 months after operation. And we compared them respectively and analyzed them with pairing

t-test, pearson correlation coefficient and multiple regression analysis.

The results were as follows;

1. Skeletal class group was narrower in oropharyngeal and hypopharyngeal airway space(PAS-ML, PAS-UT, H-PhW, V-PhW) than skeletal class was, but rather wider in nasopharyngeal airway space(PAS-NL, PhW1-PNS).
2. Skeletal class group was increased in all the level of PAS, especially PAS(ML) and PAS related to hyoid bone(H-PhW, H-PhW(Me-H)) was significantly decreased within 6 months after operation but that was larger than preoperation.
3. The PAS was increased after mandibular advancement surgery and there was no significant correlation between PAS and surgical methods.
4. There was statistical significance between PAS and a number of surgical movement.
5. The hyoid bone was more posterolaterally positioned in class malocclusion group and advanced within 2 weeks after operation but relapsed within the follow up period.

In the end of the study, it was turned out that PAS was always wider without distinction of the region after the operation and that there was significant correlation between the moving volume of hard tissues and the changing quantity of PAS (; how much PAS was changed according to the moving degree of hard tissues).

After this, to be based on the study, I consider that OSAS demands further study and that it is necessary to do more practical applications to the patients.

Key words : obstructive sleep apnea syndrome, skeletal class malocclusion, posterior airway space