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가 , 106-120. 가 1-2 가 , 2000, 5, 2 가 가 가 , , Visi-Pitch 가 가 가 115 33 가 VOT VOT jitter diadochokinetic rate jitter 1% diadochokinetic rate 1-2 가 가 가 가 가 가

(hoarseness)가 6 %- 23 % (VPI: velopharyngeal insufficiency) (Wilson, 1979; Silverman & Zimmer, 1975).

(Bzoch, 1964).

가 , (cul-de-sac resonance)가 가

/ㅁ, ㄴ, ㅇ/

가

/ㅅ, ㅆ, ㄹ/

/ㅂ, ㅃ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ/

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IALP

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가 ASHA

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1. 가

가

가 가 가 가 가 가 가 가 가

< - 1>

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가	가	
Nasometer I & II	/ a, i, u, e, o, w/ /ja, we wi/ /mama/, /nana/, /aŋaŋ/, /mimi/, /nini/, /iqiq/	Hypernasality Hyponasality
Spectrography	/ a, i, u, e, o/ /pap/, /pip/, /pup/, /pep/, /pop/	Formant F ₁ & F ₂ VOT
Visi-Pitch	/a-/ /i-/ /i-/	Phonatory/respiratory control Jitter

가.

(Nasometer I & II) Fletcher가 Tona I & II Kay
 Elemetrics I II가 . I II

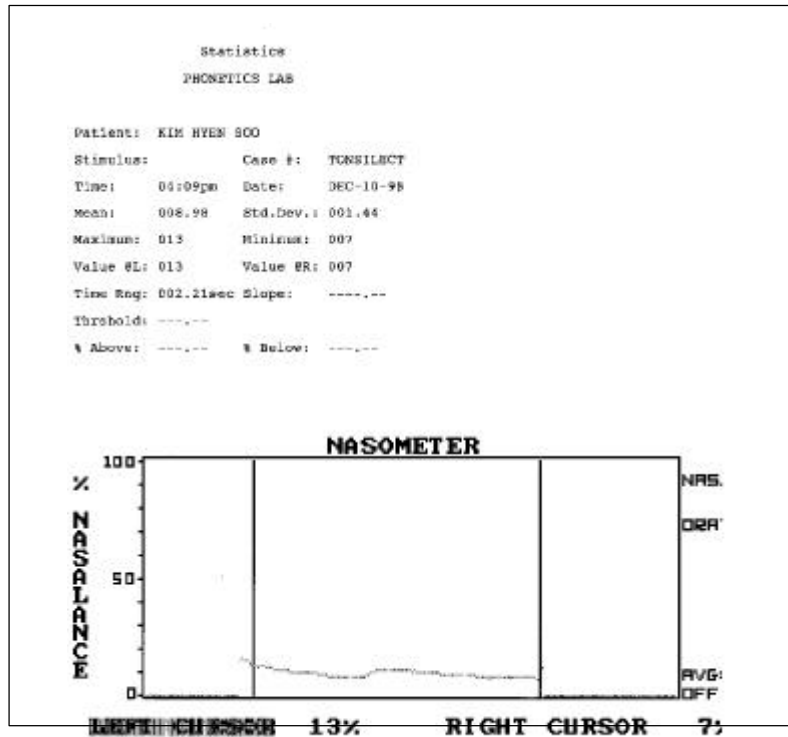
1>

(nasalance)

90

가

가



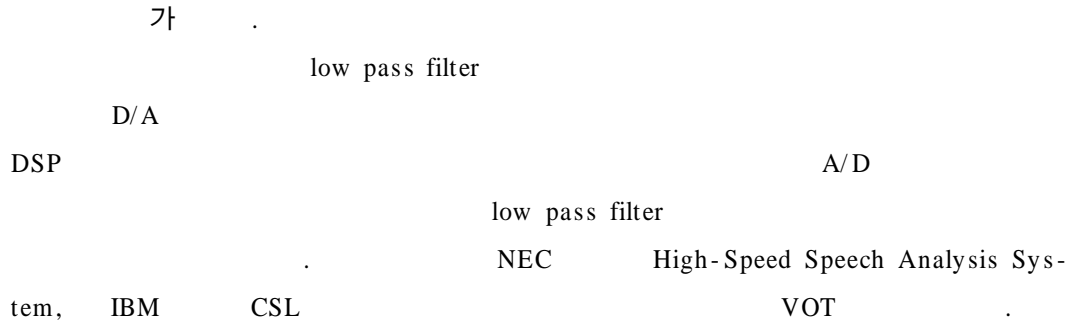
< - 1>

716

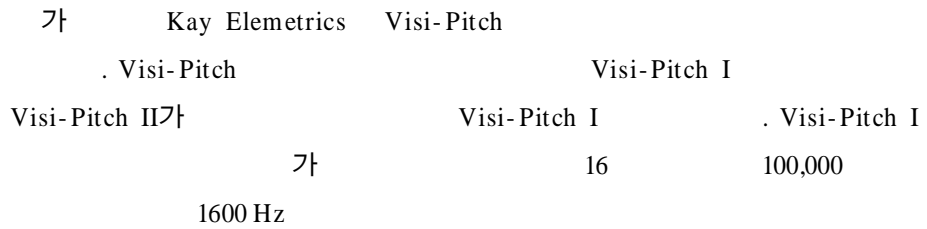
Articulation Reaction Time)

(ART: power spectrum

가



. Visi-Pitch



가

1.

	/a/	/i/	가
< - 2>	(6 , 7)	(12 , 5)	/a/
/i/	.	/a/	15.8 ±
18.4 %	19.0 ± 8.6 %	/i/	
16.9 ± 6.7 %		54.3 ± 26.7 %	37 %
.	/i/		가
(. , 1994)		50 %	

가 .

< - 2> (%)

			/a/	/i/
	6 7	7.5 ± 3.0	15.8 ± 18.4	16.9 ± 6.70
	12 5	7.7 ± 3.0	17.7 ± 8.60	54.3 ± 26.70

2. VOT

가 .

, 51 (29 , 22)
(3 , 3) VOT

1 2

. < - 3>

VOT

VOT 37.06 ± 6.32 ms

VOT 61.2 ± 46.9 ms

가 .

< - 3>

VOT

		VOT (ms)	F ₁ (Hz)					F ₂ (Hz)				
			/i/	/e/	/u/	/ɔ/	/a/	/i/	/e/	/u/	/ɔ/	/a/
29 22	11.7 ± 0.9	37.06 ± 6.32	412	669	490	590	961	2608	2297	1566	1097	1714
3 3	8.4 ± 3.4	61.2 ± 46.9	386	546	467	523	635	2075	2030	1359	1216	1428

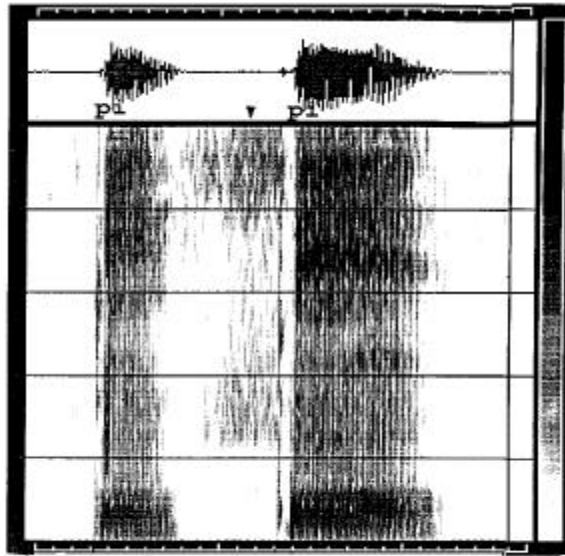
VOT

. < -

가

2>

VOT 40 ms 가
VOT가



< - 2> /p/ 가

	5	/i, e, u, o, a/	1	(F ₁)	2	(F ₂)
			1	/i/-/e/-/a/	412 Hz-669	
Hz-961 Hz		가 /o/-/u/	590 Hz-490 Hz		2	
/i/-/e/-/a/-/o/	2608 Hz-2297 Hz-		1714 Hz-1097 Hz		/u/	1566
Hz					1	
/i/-/e/-/a/	386 Hz-546 Hz-635 Hz	가 /o/-/u/	523 Hz-467 Hz			
	2		/i/-/e/-/a/-/o/	2075 Hz-2030 Hz-1428 Hz-		
1216 Hz	/u/	1359 Hz		/o/		
	119 Hz	가	/u/		207	
Hz		가				

3.

< - 4> /a/ /i/

12.2 ± 2.3 , 7.1 ± 2.0 , 6.5 ± 2.2

(: 247.3 ± 21.2 Hz, : 258.7 ± 21.2 Hz) (: 270.5 ± 35.7 Hz, : 277.7 ± 34.2 Hz) (: 57.8 ± 5.3 dB, : 51.0 ± 4.5 dB) (: 54.2 ± 5.2 dB, : 45.2 ± 3.9 dB)

(: 41.3 ± 33.3 Hz, : 55.6 ± 44.6 Hz)

(: 74.9 ± 73.7 Hz, : 111.0 ± 151.8 Hz)

< - 4> /a/ /i/ ,

			/a/				/i/				jitter
			Dur	AFo	AdB	Fo Range	Dur	AFo	AdB	Fo range	
35 16	11.7 ± 0.9	11.4± 25	247.3± 21.2	57.8± 5.3	41.3± 33.3	12.2± 2.4	258.7± 21.2	51.0± 4.5	55.6± 44.6	0.6± 0.5	
8 2	6.6 ± 2.0	7.1± 2.0	270.45± 35.73	54.22± 5.19	74.92± 73.7	6.45± 2.24	277.67± 34.16	45.17± 3.91	111.01± 151.75	1.26± 0.20	

Dur: , AFo: , AdB: , Fo range:

가 /i/ jitter

jitter 0.6 ± 0.5 % jitter 1.3 ± 2.0 % Koike

가 가 1% 가

가 가 2

Daniel Boon 가

가 diadochokinetic rate 10.5 ±

1.2 가 5 ± 2.4 2

가 .

2.

(Karnell & van Demark, 1986). Shprintzen et al. (1975) “ 가

van Demark et al. (1979)

18

가

가

8

가

가.

See-Scape, Nasometer, Nasoendoscopy Palatometer

(1) See-Scape

See-Scape

가

. See-Scape

See-Scape

/ㅁ, ㄴ, ㅇ/

CV

가

가

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/ㄷ/

/ㅅ/

(2)

가

no nasal passage, mild nasal

passage high nasal passage

. < - 5>

< - 5>

VC	VCV	CV	VCCV
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gagging,

가

1 가

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1 -2

5 10

1

가

(1)

가

(palatal lift prosthesis)

(speech obturator)

가 ,
(velopharyngeal port)

가

(, 1998). < - 3>

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< 3 >

V.

1990 . (IALP) ASHA

가 . 가

가 . 가

mapping . 1990

Nasometer, Visi-Pitch, DSP Sonagraph, CSL, Aerophone II, Laryngeal Stroboscopy, Mac-

quirer . 가
가 ,
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ABSTRACT

Objective Evaluation and Therapy of Speech in
Children with Cleft Palate

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Children with cleft palate often show speech problems even though they received early surgical operation. The typical speech problems of children with cleft palate are the resonance disorder, voice disorder and articulation disorder. The speech evaluation of cleft palate has been tested by subjective methods. The aim of present study was to obtain acoustic data of cleft palate speakers. One hundred and fifteen normal children and 33 children with cleft palate participated in this study. Nasometer, Spectrography and Visi-Pitch were used to measure the hypernasality, voice color and voice quality separately. The acoustic characteristics of the speech in children with cleft palates were found as follows: (1) More than 50 % of the subjects with cleft palate showed the nasalance of the high vowel /i/; (2) the VOT of cleft-palate subjects was two times longer than that of normal children; (3) the maximum phonation time of children with cleft palate was about half of that of normal children; (4) the jitter of children with cleft palate was over 1.3 %; (5) the diadochokinetic rate of children with cleft palate was one-half of that of normal children.

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