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안면비대칭 환자에서 하악 우각부위의 연조직 형태에 결정적 영향을 미칠 수 있는 교근의 성상에 대한 평가는 경조직의 분석과 더불어 중요하다. 교근은 수술로 인한 하악의 후방이동 시 가장 많은 영향을 받는 구조 중 하나이며, 수술 후 교근의 상태는 환자의 저작력과 하악 우각부 외형에 영향을 줄 수 있다. 본 연구는 안면비대칭을 가진 골격성 III급 부정교합자의 편위, 비편위측 교근의 형태학적 차이와 하악골 후퇴술 이후 양측 교근의 변화를 비교 분석하고자 하였다. 또한 안면비대칭의 개선 전, 후 교근을 정상교합자와 비교하여 비대칭의 수술이 교근에 미치는 영향을 알아보고자 하였다. 안면비대칭으로 진단된 환자 12명의 양악수술 전후의 3차원 CT 영상과 정상교합자 10명의 3차원 CT 영상에서 하악골과 교근을 계측, 분석하였다. 연구 결과 비대칭군에서 교근의 편위, 비편위측 모두 정상교합군에 비해 부피가 작고, 최대 단면적 부위가 좁은 것을 알 수 있었으며, 편위, 비편위측의 교근의 주행각도 차이와 최대 단면적 부위에서의 두께 차이가 정상 교합군보다 크게 나타났다. 양악 수술 전, 후에 교근의 주행각도는 유의성 있게 감소하였고, 편위, 비편위측 각도의 차이도 감소하였으며, 최대 단면적 부위에서의 교근의 두께가 유의성 있게 증가하였다. 비대칭 수술 후 좌우 교근은 너비를 제외하고는 정상 교합자와 유의차 없게 변화하였다. 이상의 연구 결과, 안면비대칭 환자는 교근의 성상이 분명히 정상 교합자와는 다르지만, 적절한 수술 후에 경조직뿐만 아니라 교근도 정상범주로 변화하였음을 알 수 있었다. (2009;39(1):18-27)

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Hemifacial microsomia

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: 2008 12 15 .
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III
 sagittal split ramus osteotomy (SSRO) intraoral vertical ramus osteotomy (IVRO)

8 (23.5) 10
 10 [5 (19.25), 5 (20.16)]

IVRO

연구방법

mandibular notch

3

III

Katsumata⁵

3D-CT
 CT image CT Hispeed Advantage (GE Medical System, Milwaukee, WI, USA)
 FH plane (Frankfort)

CT
 Axial image 3 mm 6 mm
 table speed

III

axial image DICOM (Digital Imaging & Communication in Medicine) file
 V-worksTM 4.0 (Cybermed Inc., Seoul, Korea)
 3D model

maximum intensity projection (MIP) mode Hounsfield Units (HU)
 4

selection of demand (SOD) (segmentation)

bone SOD

bone threshold SOD

연구대상

HU - 35 - +500

3 CT

III

V-worksTM 4.0 (Cybermed Inc., Seoul, Korea)

3

3 mm

(LeFort I osteotomy + bilateral intraoral vertical ramus osteotomy)

Menton (shifted side), (non-shifted side)

12 4 (21.8),

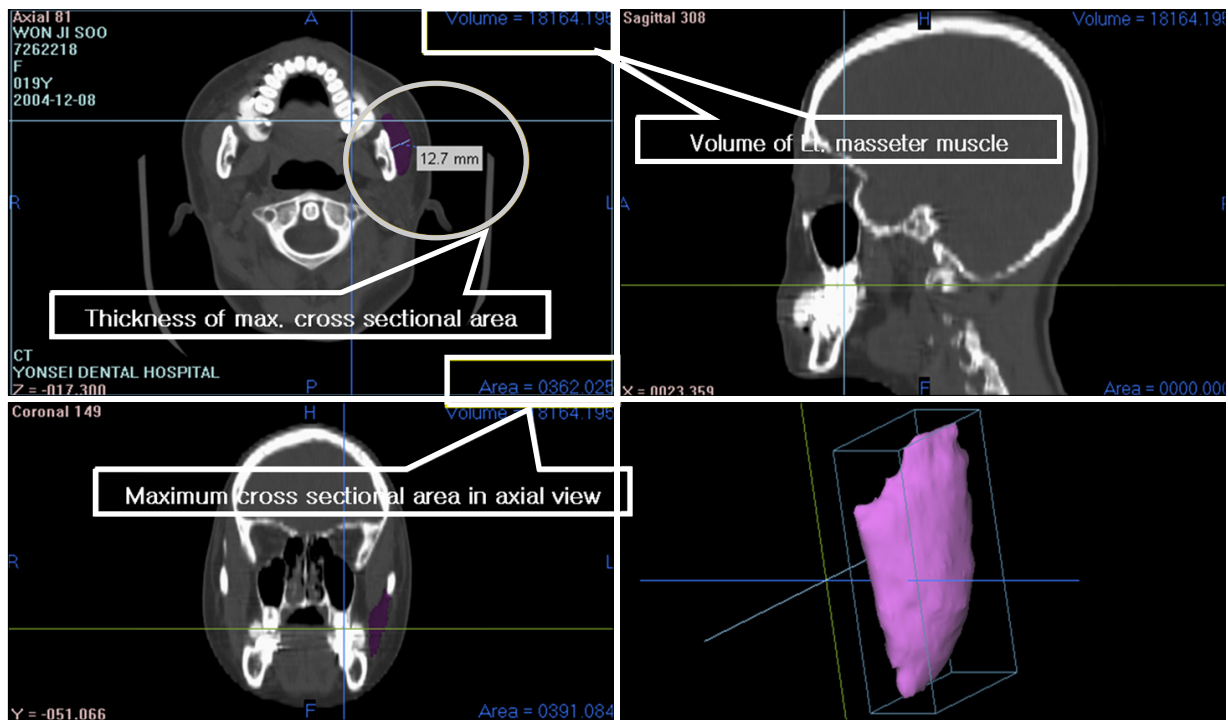


Fig 1. Measurement of total volume, maximum cross-sectional area in axial view of the masseter muscle and thickness of the maximum cross sectional area.

1. 3D image (Fig 1)
 CT axial view
 CT axial view
 2 1 cm

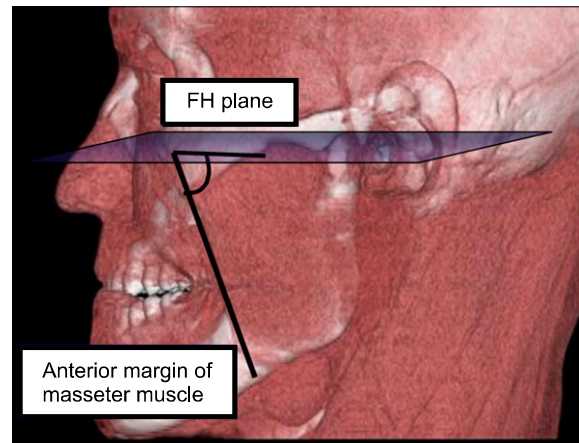


Fig 2. Measurement of the masseter muscle angle.

2 (Fig 2)
 FH plane
 3 (Fig 3)
 CT axial image
 transverse section line
 () Fig 3

4 3D image SOD
 3D Measure

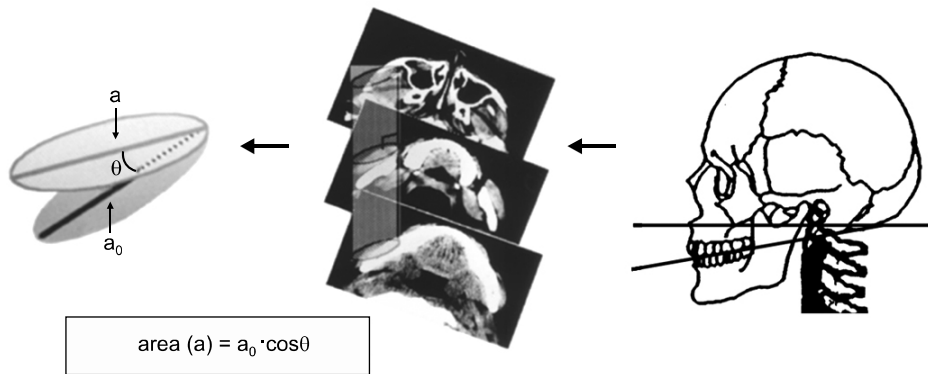


Fig 3. Measurement of maximum cross-sectional area on a section perpendicular to the direction of the masseter muscle. a, Maximum area of masseter muscle; a_0 , cross-sectional area measured on an axial image; θ , angle between the axial image and the section perpendicular to the muscle direction.

3 CT Axial im- paired *t*-test 2 III

age DICOM (Digital Imaging & Communication in V-works™ 40 (Table 1). III

Medicine) file , V-works™ 40 (Cybermed Inc., Seoul, Korea) 3D model (p 0.05). III

SOD (selection of demand) (p 0.01) (p 0.05) (p 0.01).

2 III paired *t*-test (p 0.01) (p 0.01).

Wilcoxon Signed Rank Test III (p 0.01) (Table 2). III

Rank Test Wilcoxon Signed (p 0.01), (p 0.05). III

Wilcoxon Rank Sum Test (p 0.05).

Table 3. Changes in the masseter muscle measurements between pre and post operative stage

Variables	Pre-op (T1)			Post-op (T2)			T (T2 - T1)			Sig
	Median	Min	Max	Median	Min	Max	Median	Min	Max	
Vol-shift (mm ³)	18459.00	14908.00	34320.00	19660.00	14998.00	38672.00	1115.00	-2231.00	4352.00	*
Vol-nonshift (mm ³)	19587.00	14933.00	32245.00	19728.00	15182.00	38294.00	792.00	-2604.00	6049.00	NS
Vol-diff (%)	-0.27	-6.41	3.62	0.50	-2.94	3.68	2.48	-2.63	6.04	*
Angle-shift (°)	72.22	63.81	81.96	65.20	57.02	73.44	-8.83	-15.10	0.46	†
Angle-nonshift (°)	73.86	63.81	84.81	64.82	59.49	72.90	-9.95	-18.48	-1.84	†
Angle-diff (°)	-3.61	-7.31	5.09	-1.62	-2.99	3.13	2.63	-7.56	7.10	*
Area-shift (mm ³)	345.50	288.00	529.00	363.50	261.00	570.00	12.00	-66.00	119.00	NS
Area-nonshift (mm ³)	358.50	244.00	465.00	370.50	239.00	547.00	29.00	-39.00	82.00	NS
Area-diff (mm ³)	-6.50	-60.00	64.00	-1.00	-62.00	70.00	1.00	-79.00	60.00	NS
D-shift (mm)	6.45	4.00	7.60	6.50	2.00	8.30	0.55	-2.90	2.90	NS
D-nonshift (mm)	5.30	3.50	8.50	5.70	4.00	8.50	0.90	-3.30	2.20	NS
D-diff (mm)	0.80	-2.80	3.00	0.85	-2.80	2.90	0.30	-3.73	4.30	NS
T-shift (mm)	11.45	9.00	15.00	13.20	9.60	16.00	1.35	-1.20	3.50	*
T-nonshift (mm)	11.70	7.50	13.70	13.95	9.80	16.60	2.50	0.10	11.20	†
T-diff (mm)	0.15	-1.20	2.00	-0.75	-3.20	0.80	-1.25	-10.90	0.90	*
L-shift (mm)	73.04	57.00	82.20	65.10	53.70	80.00	-8.80	-15.38	-1.00	†
L-nonshift (mm)	71.65	63.10	86.00	62.45	57.00	85.70	-7.42	-16.60	1.90	†
L-diff (mm)	-1.61	-9.00	8.50	-0.25	-5.70	8.80	2.35	-7.85	4.22	NS
W-shift (mm)	41.45	38.60	51.80	42.25	39.70	51.00	1.35	-2.90	6.07	*
W-nonshift (mm)	43.15	37.20	47.00	42.40	39.70	49.20	0.75	-3.30	5.00	NS
W-diff (mm)	0.12	-3.87	4.80	0.25	-7.20	5.20	1.30	-7.90	6.30	NS

Pre-op, Pre operative stage; Post-op, post operative stage; - shift, measurement in shifted side; - nonshift, measurement in non-shifted side; - diff, difference between shifted and non-shifted side (shift-nonshift); - diff (%), (Vol-shift - Vol-nonshift) / (Vol-shift + Vol-nonshift) × 100 (%). **p* < 0.05, †*p* < 0.01. Min, minimum; Max, maximum; Sig, significance; NS, not significant.

Table 4. Comparison of masseter muscle measurements in normal occlusion and post operative asymmetry groups

Variables	Asymmetry group (shifted - side)			Sig	Normal occlusion			Asymmetry group (nonshifted - side)			Sig
	Median	Min	Max		Median	Min	Max	Median	Min	Max	
Vol (mm ³)	19660.00	14998.00	38672.00	NS	25186.50	18354.00	29242.50	19727.50	15182.00	38294.00	*
Angle (°)	65.20	57.02	73.44	NS	64.55	59.50	74.78	64.82	59.49	72.90	NS
Area (mm ³)	363.50	261.00	570.00	NS	440.25	366.50	564.00	370.50	239.00	547.00	NS
D (mm)	6.50	2.00	8.30	NS	5.98	4.60	8.75	5.70	4.00	8.50	NS
T (mm)	13.20	9.60	16.00	NS	14.20	12.00	16.60	13.95	9.80	16.60	NS
L (mm)	65.10	53.70	80.00	NS	65.78	57.55	67.23	62.45	57.00	85.70	NS
W (mm)	42.25	39.70	51.00	*	46.45	43.10	51.40	42.40	39.70	49.20	†

The same abbreviation as Table 1. **p* < 0.05; †*p* < 0.01. Min, minimum; Max, maximum; Sig, significance; NS, not significant.

3189 mm²

3

1

Katsumata⁵

Goto²⁴

variation

Maki³

(Table 4).

bone mineralization

, follow

up

12

III

[LeFort I osteotomy + bilateral intraoral vertical ramus osteotomy (IVRO)]

(Table IVRO

3).

III

12

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3

10

(Table 3). Katsu-

mata⁵

1 cm

1.

(p

0.05).

2

($p < 0.05$).

($p < 0.01$)

($p < 0.05$)

3

($p < 0.01$),

($p < 0.05$),

4

($p < 0.01$).

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