

Cephalometric Characteristics of the Patients with Developed Anterior Open Bite Following Anterior Disc Dislocation without Reductions

Yun-Kyung Hur, D.D.S.,M.S.D., Jae-Kap Choi, D.D.S.,M.S.D.,Ph.D.

Department of Oral Medicine, School of Dentistry, Kyungpook National University

Objectives: This article reported three patients developed anterior open bite seemed to be related to TMJ anterior disc dislocation without reduction(ADD WO R), but no evidence of condylar destructive or collapse and analyzed the craniofacial skeletal structure by means of cephalometric analysis.

Results: All patients suddenly developed a centric relation/centric occlusion discrepancy, an increased overjet and an anterior open bite following ADD WO R. All patients had Angle's Class I occlusion and shallow bite, but they had skeletally Class III and Class II pattern and all were vertically significant hyperdivergent type.

Conclusions: These 3 patients had characteristics of common facial morphology including: (1)Angle classification Class I and shallow bite, (2)high mandibular plane angle, (3)high gonial angle. Developed anterior open bite resulted from clockwise rotation of the mandible related TMJ ADD WO R, rather than a result from the eruption of posterior teeth. We hypothesize rotation may relate to attached direction of masticatory muscle.

Key words: Developed anterior open bite, ADD WO R, Acute CR/CO discrepancy, Clockwise rotation

I. INTRODUCTION

One of the most common temporomandibular disorders is a disc derangement related to anterior disc displacement. Among these patients, we can occasionally find the patients with developed anterior open bite before or during treatment. Although the anterior open bite is uncommon complication of the temporomandibular disorders, but it often embarrasses clinical practitioners due to its difficulty of management and poor prognosis.

Several authors proposed that the ant. open bite may result from condylar collapse, which was associated with inflammatory disorders of the TMJ, such as rheumatoid arthritis.¹⁻⁶⁾ However, we have experienced some cases of anterior open bite, which developed in the patients with anterior disc dislocation without reduction(ADD WO R), but no evidence of condylar destructive or collapse. None of them show any signs of TMJ arthritis except occasional tenderness on lateral palpation. In this article, three clinical cases of acquired anterior open bite following ADD WO R were analyzed clinically as well as cephalometrically. The two patients showed anterior open bite developed during conservative treatment, such as physical, medical therapy and they did not taken splint treatment for a follow-up. The other one patient was clinically diagnosed as anterior disc displacement with

Corresponding author: Prof. Yun-Kyung Hur
*Department of Oral Medicine, School of Dentistry,
Kyungpook National University 2-188-1, Samduk-Dong,
Jung-Ku, Daegu 700-412, Korea*
E-mail: knuykhur@mail.knu.ac.kr

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reduction of both TMJs at first visit and did not given any treatment. After 9 months, the patient complained occlusal change accompanied with dull pain of both TMJs. On diagnostic casts, the anterior open bite can't be seen and pre-existing occlusal facets of upper and lower teeth can make contact precisely.

The aims of this study were to review in the course of time three clinical cases of developed anterior open bite following ADD WO R and to analyze the craniofacial skeletal structure by means of cephalometric analysis.

CASE I

Age : 20

Gender : female(Fig. 1A)

Diagnosis : both TMJs ADD WO R

Progress :

2004. 12. 7.

Chief complaint was both TMJ pain during mastication, especially left, and limited opening.

Panoramic and transcranial radiographs showed decreased condylar movement but no condylar resorption(Fig. 1B, 1C).

Medication(NonSteroidal Anti-Inflammatory Drugs) was done.

2004. 12. 21.

Patient complained increased pain.

Medication(NSAIDs) and physical therapy were done.

Clinical diagnosis was ADD WO R of both TMJs.

2004. 12. 29.

On magnetic resonance image(MRI) of TMJ, both TMJs had ADD WO R(Fig. 1D).

2005. 1. 12.

She experienced alteration in occlusion and sound of teeth grinding at reaching centric occlusion.

Premature contact was found on occlusion of #27, 37 but the patient could make contact to centric occlusion at clenching(Fig. 1F).

Impression was taken for study model(Fig. 1H).

2005. 1. 19.

The patient complained suddenly developed ant. open bite(Fig. 1G).

Cephalometric radiograph were taken(Fig. 1E).

When we compared with occlusal contacts between study model and present occlusion, the discrepancy was found.

CASE II

Age : 32

Gender : female(Fig. 2A)

Diagnosis : Lt TMJ ADD WO R

Progress :

2005. 2. 2.

Chief complaint was left TMJ pain during mastication and limited opening.

Panoramic(Fig. 2B) and transcranial radiographs (Fig. 2C) showed decreased condylar movement of Lt. TMJ but no condylar resorption.

2005. 2. 17.

Clinical diagnosis was ADD WO R of left TMJ. Medication(NSAIDs) and physical therapy were done.

2005. 3. 17.

She suffered from same symptoms.

Patient demanded only medication.

Medication(NSAIDs) and physical therapy were done.

2005. 3. 31.

Patient complained interocclusal sliding at occlusion and occasional headache.

Medication(NSAIDs) was done and impression was taken for study model(Fig. 2G).

2005. 4. 14.

Alteration in occlusion was developed.

Suddenly centric relation/centric occlusion discrepancy was 2 mm.(Fig. 2E, 2F)

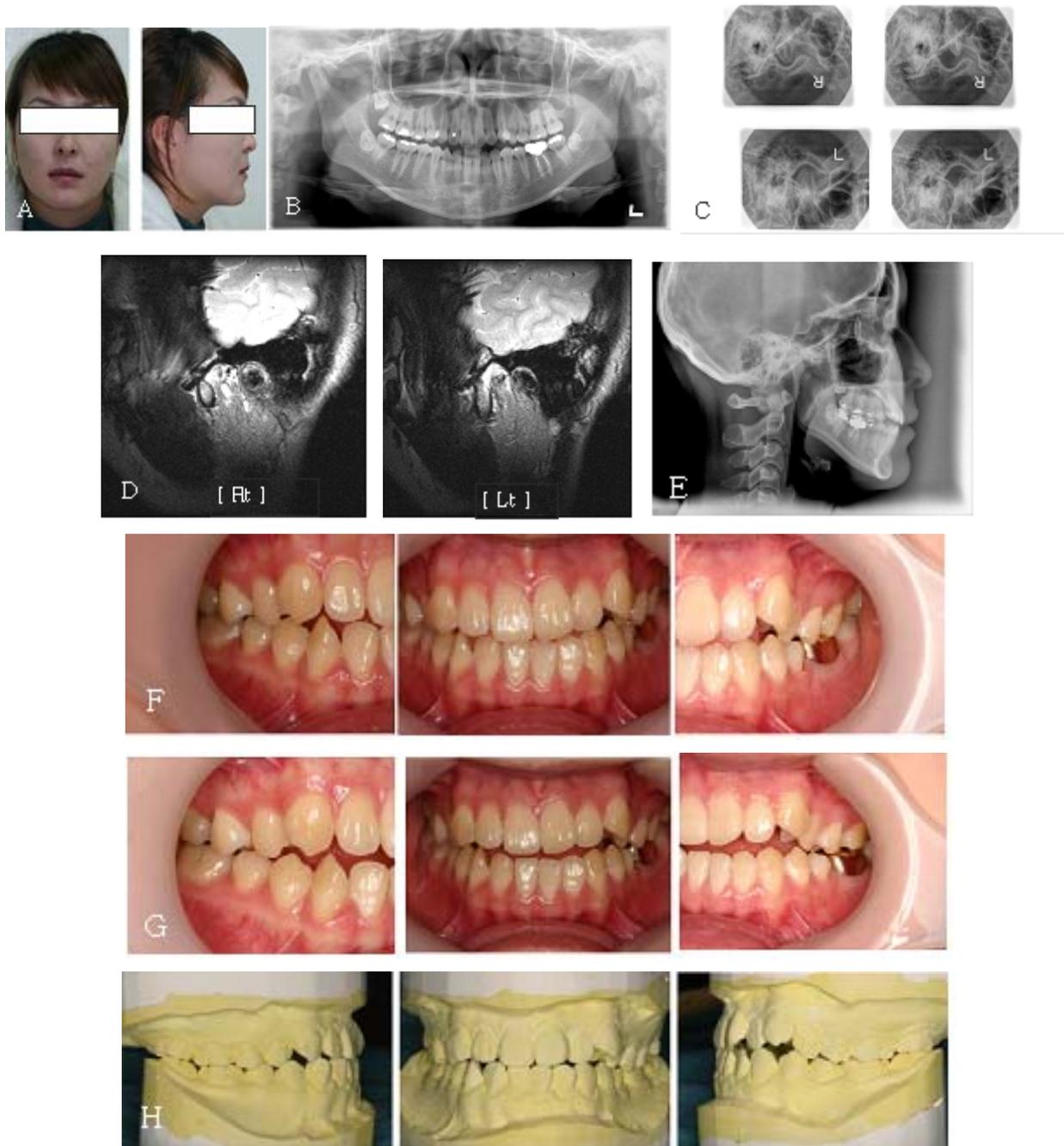


Fig. 1. A, Frontal and sagittal profile views; B, panoramic view, no condylar resorption on both sides; C, transcranial view, both condyle movement were decreased; D, MRI, both TMJs were ADD WO R; E, cephalometric radiograph; F, intraoral photograph of centric occlusion at clenching; G, intraoral photograph of centric relation; H, occlusion of study model

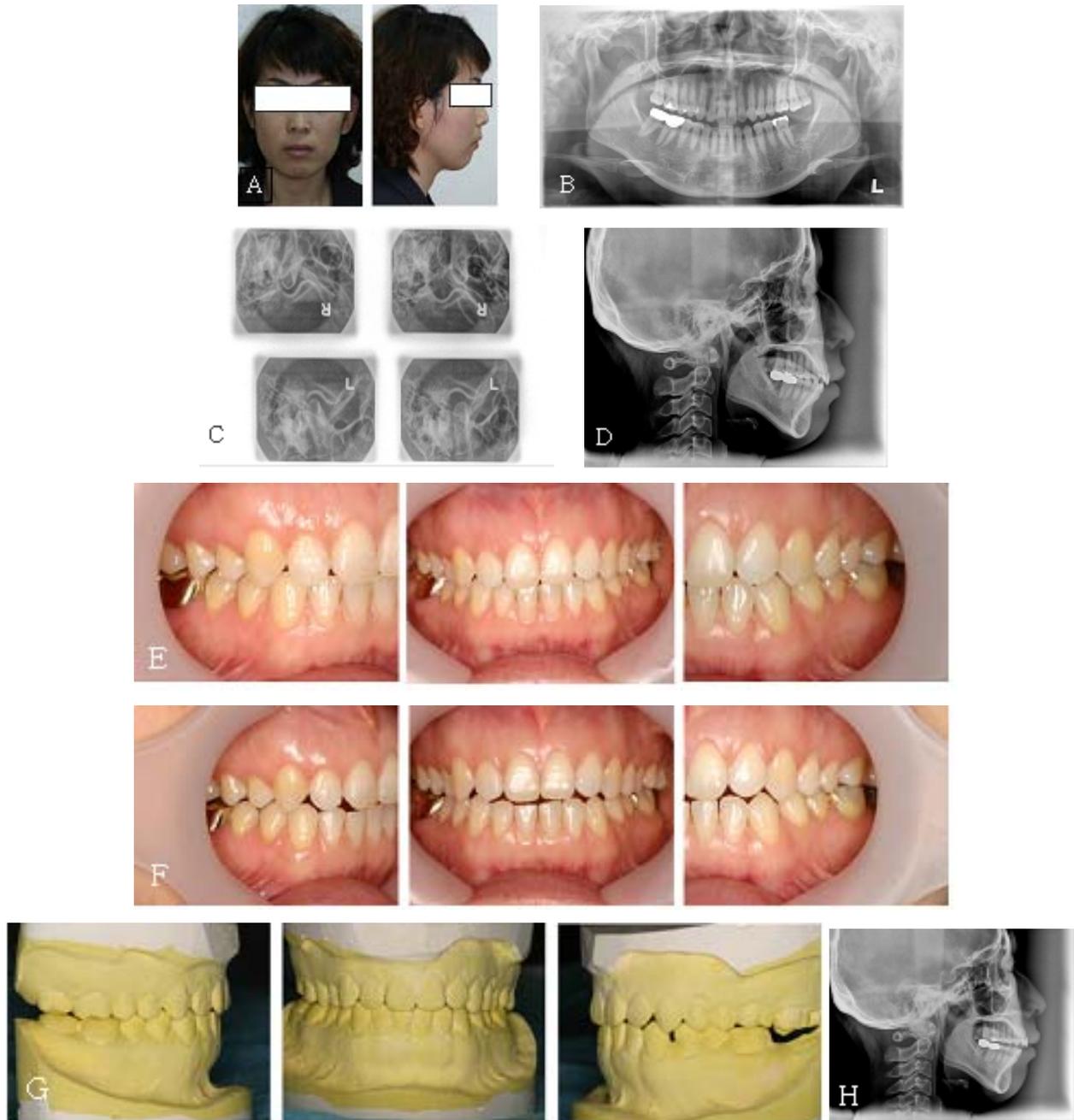


Fig. 2. A, Frontal and sagittal profile views; B, panoramic view, Lt. condylar resorption couldn't find; C, Lateral transcranial view, Lt. condyle movement was decreased; D, cephalometric radiograph; E, intraoral photograph of centric occlusion at clenching; F, intraoral photograph of centric relation at same day; G, occlusion of study model; H, after one month cephalometric radiograph

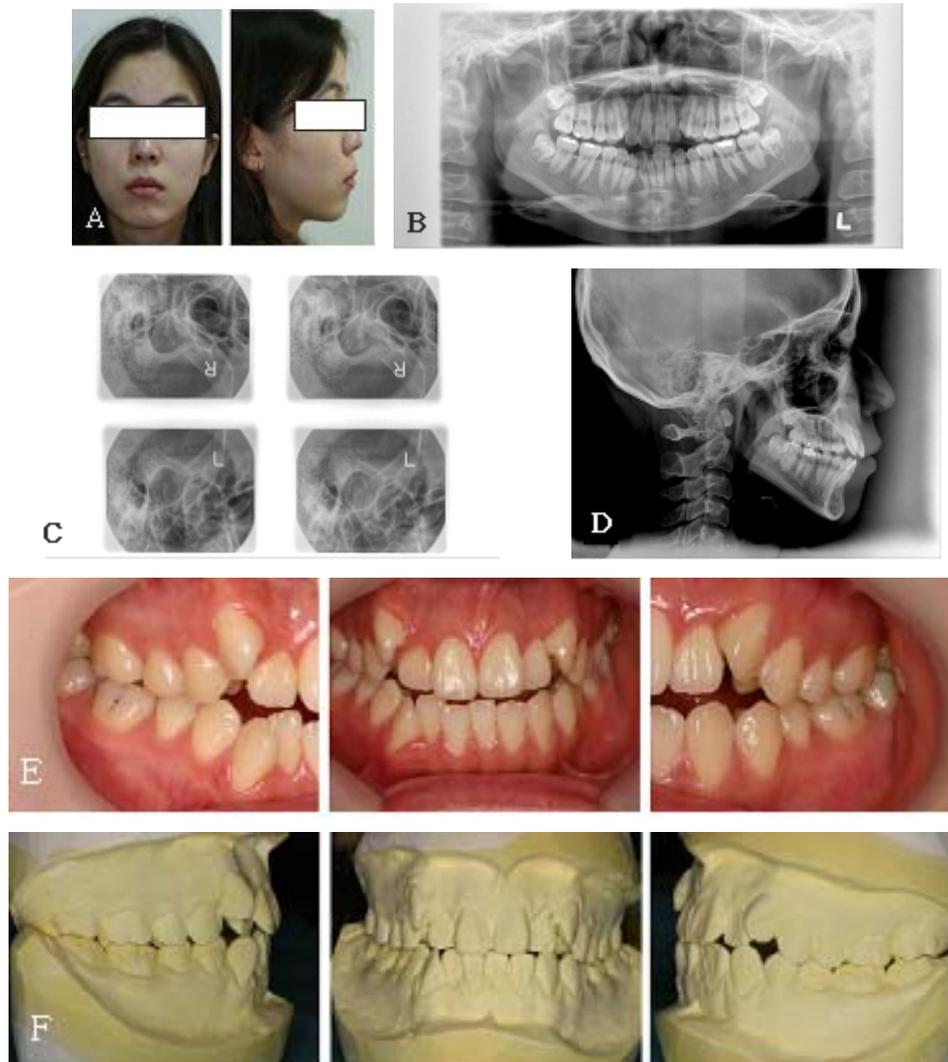


Fig. 3. A, Frontal and sagittal profile views; B, panoramic view, no condylar resorption on both TMJs; C, transcranial view, both condyle movement were not decreased; D, cephalometric radiograph; E, intraoral photograph of present occlusion; F, occlusion of study model

Occlusal contact was only attained between #26 and 36 and ant. open bite was found.

Cephalographic radiograph at CO were taken(Fig. 2D).

When we compared with occlusal contacts between study model and present occlusion, the discrepancy was found.

2005. 5. 18.

Ant. open bite was increased.

Cephalographic radiograph(CR) was taken(Fig. 2H).

CASE III

Age : 21

Gender : female(Fig. 3A)

Diagnosis : both TMJs ADD WO R

Progress :

2003. 7. 23.

Clinical diagnosis was anterior disc dislocation with reduction(ADD W R) of both TMJs.

Overbite : 1 mm / Overjet : 2 mm (in previous chart)

Table 1. Comparison of cephalometric variables of subjects

Variables	case I	case II	case III	Mean
Cranial base relationships				
Anterior cranial base length(S-N) (mm)	71.7	63.2	68.7	68.7
Posterior cranial base length(S-Ar) (mm)	34.4	32.8	33.9	36.7
Saddle angle(N-S-Ar) (°)	118.6	130.9	123.5	125.9
Maxillomandibular relationships				
SNA angle (°)	80.4	84.5	81.7	81.6
SNB angle (°)	79.7	77.3	77.7	79.2
ANB angle (°)	0.7	7.2	4.0	2.5
Vertical skeletal relationships				
FMA (°)	31.2	35.5	33.3	24.3
SN to mandibular plane angle (°)	42.0	45.3	40.9	33.4
FH to palatal plane angle (°)	0.5	0.8	-2.6	0.6
Maxillomandibular plane angle(ANS-PNS/Go-Me) (°)	30.7	34.7	35.9	24.7
Occlusal plane to mandibular plane angle (°)	19.3	17.4	20.1	15.4
Total anterior facial height(N-Me) (mm)	130.7	133.0	130.3	127.4
Total posterior facial height(S-Go) (mm)	76.0	80.4	77.7	85.1
Lower anterior facial height(ANS-Me) (mm)	72.5	80.7	76.8	70.7
Total post. facial height/Total ant. facial height(%)	58.2	60.4	59.6	66.8
Size and form of mandible				
Ramus height(Ar-Go) (mm)	44.1	50.9	46.3	51.6
Mandibular body length(Go-Me) (mm)	79.5	72.4	79.6	78.0
Gonial angle (Ar-Go-Me) (°)	133.1	127.6	126.4	118.7
Articular angle(S-Ar-Go) (°)	150.4	146.8	151.1	148.7
Y axis	58.0	68.0	63.5	61.0

mean : mean of Korean adult female with normal occlusion

The patient did not visited since 23. July 2003.

2004. 10. 4.

Patient complained alteration in occlusion and dull pain on both TMJs from several months ago.

Panoramic(Fig. 3B) and transcranial(Fig. 3C) radiographs revealed no decreased condylar movement and condylar resorption of both TMJs.

Both TMJs sounds were not found.

Overbite : -1.5 mm / Overjet : 3 mm

Clinical diagnosis was ADD WO R of both TMJs.

2004. 11. 3.

Patient complained discomfort of both TMJ during opening.

Facial & intraoral photographs and impression were taken.

2004. 12. 15.

Cephalometric radiograph was taken(Fig. 3D).

When we compared with occlusal contacts between study model and present occlusion, the discrepancy was found(Fig. 3E, 3F).

II. RESULTS

All patients had experienced common signs/symptoms of TMJ internal derangement.

All affected TMJs have ADD WO R.

All patients suddenly developed a centric relation/centric occlusion discrepancy, an increased overjet and an open bite following ADD WO R.

All patients had Angle's Class I occlusion and shallow bite, but they had skeletally Class III and Class II pattern and all were vertically significant hyperdivergent type.

The cephalometric findings in the 3 patients are compared with established mean normal values of Korean adult female(Table 1).

Skeletal characteristics of case I patient were as follows: (1)straight facial type with ANB 0.7, (2)high occlusal and high mandibular plane angle, (3)high gonial angle, (4)increased mandibular body length, (5)decreased ramus height. From these results, the patient had skeletal Class III tendency with vertical discrepancy. Case II patient had skeletal Class II pattern with ANB 7 and high mandibular plane angle. Case III patient had also decreased ramus height and increased lower ant. facial height as hyperdivergent skeletal type.

III. DISCUSSION

Cases of developed anterior open bite following severe TMJ destruction have been reported.¹⁻⁶⁾ Most of these open bite cases belong to progressive and more rapid destructive disease of the TMJ. They included rheumatoid arthritis, juvenile RA, psoriatic arthritis, and very rare connective tissue diseases. In severe cases with lost condylar support, an acute malocclusion results in characterized by heavy posterior contacts and an

anterior open bite. However, these 3 patients seemed to be related to TMJs ADD WO R, but no evidence of condylar destructive or collapse and sudden occurrence of a centric relation/centric occlusion discrepancy is a result from the clockwise rotation of the mandible related ADD WO R, not from the eruption of posterior teeth.

Chen and associates reported⁷⁾ cases of acquired anterior open bite and all these patients had anteriorly displaced discs. As the etiology of occurrence of open bite, they hypothesized that this bite change might result from self-limiting degenerative joint disease. The etiology of clockwise rotation of the mandible related TMJ ADD WO R has not been studied enough yet. Takada and associates⁸⁾ analyzed the appropriate orientation of the superficial masseter and temporalis muscles associated with dentofacial morphology using head films, the origins and insertions being identified by examination of dry skulls for means of anatomic and geometric criteria. This study suggested that an association exists between an obliquely inclined masseter muscle relative to the occlusal plane and a short posterior face height, a steep mandibular plane and a large gonial angle in long-faced persons. Brachyfacial type with a flat mandibular plane and an acute gonial angle represent a vertically oriented masseter muscle. We hypothesize rotation may relate to attached direction of masticatory muscle. Further study is needed in the future.

These 3 patients have characteristics of common facial morphology including: (1)Angle's Class I and shallow bite, (2)high mandibular plane angle, (3)high gonial angle.

Huang et al.⁹⁾ and Wolford et al.¹⁰⁾ reported the skeletal characteristics of the patients with idiopathic condylar resorption. These were composed of high mandibular plane, skeletal Class II morphology. If condylar resorptions of these 3 patients are progressed, vertical height of the ramus will be decreased and mandible will be progressively retruded, change to Class II skeletal pattern will be occurred.

After this, the etiology of the developed anterior open bite due to clockwise rotation of the mandible in ADD WO R patients and characteristics of facial morphology appear to be most susceptible to occur anterior open bite should be revealed.

IV. CONCLUSIONS

This article reported 3 patients developed anterior open bite seemed to be related to TMJ ADD WO R, but no evidence of condylar destructive or collapse and they experienced sudden occurrence of centric relation/centric occlusion discrepancy resulted from clockwise rotation of the mandible related TMJ ADD WO R, rather than a result from the eruption of posterior teeth.

These 3 patients had characteristics of common facial morphology including: (1)Angle classification Class I and shallow bite, (2)high mandibular plane angle, (3)high gonial angle.

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국문요약

비정복성 관절원판 전위와 연관되어 발생된 전치부 개교합 환자의 측방 두부방사선 계측

경북대학교 치의학전문 대학원 구강내과학 교실

허윤경 · 최재갑

임상적으로 비정복성 관절원판전위로 진단된 3명의 환자에서 이들은 모두 물리치료, 약물치료만이 행해진 환자로 내원 중에 갑작스런 교합변화 및 전치부 개교합을 나타내었다. 종래에 알려진 개교합의 발생은 류마티즘 관절염이나 양측과두의 심한 퇴행성 변화가 있는 경우에 상당한 과두지지의 상실로 후방지지를 잃게 되어 구치들이 과도하게 접촉하고 전치 개교합이 발생될 수 있는 것은 이미 잘 알려진 사실이나, 과두지지의 상실이 없는 비정복성 관절원판전위만으로 특정 환자에서는 개교합의 발생이 가능하며 이는 구치부 치아의 증출에 의한 전치부 개교합이라 볼 수 없으며, 하악의 후하방 회전의 결과로 볼 수 있다. 이들 3환자들의 전체적인 골격적 특징은 (1)구치부 앵글씨 1급 교합관계와 천피개 교합, (2)높은 하악하연각, (3)높은 하악각 등으로 봐서 상하악의 골격적 형태가 II급과 III급에 관계없이 수직적 성장이 강한 안모형태에서 갑작스런 개교합이 발생될 수 있으리라 생각된다.

앞으로 개교합이 발생되는 관절원판전위 환자에서 하악의 후하방 회전의 원인을 밝히고, 이러한 골격적인 특징이 측두하악장애의 원인 인자가 될 수 있는 지 더 많은 연구가 필요하리라 생각된다.

주제어 : 급성 전치부 개교합, ADD WO R, 급성 중심위/교합위 차이, 하악의 후하방회전