

Case Report SS: A patient with temporomandibular joint disorders

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Some types of malocclusion and traumatic occlusion affect the function of the temporomandibular joint (TMJ). Schellhas¹ indicated that internal derangements of the TMJ may contribute to the development of retrognathia. Although many researchers and clinicians have studied TMD patients²⁻⁵ and TMJ parafunction,^{6,9} there are few published reports presenting appropriate treatment and its theoretical basis.

Orthodontic treatment consists of occlusal reconstruction, regardless of whether the patient has TMD. The recognition of a new therapeutic mandibular position in TMD patients would afford orthodontists the opportunity to construct a new occlusion. TMD is presently treated by various techniques, including physical therapy, drugs, splints, and surgery. However, in many TMD cases with malocclusion, final occlusal reconstruction is a problem.

In the following case report, we present a functional examination which includes kinesiologic evaluation of a TMD patient. Treatment procedures are delineated on the basis of the results of this examination.

Case report

This 27-year-old Japanese female visited our dental hospital complaining of pain in the temporomandibular joint. Her medical history was unremarkable, but she had been conscious of clicking of the right TMJ since the age of 12; at 16, the joint had begun to lock intermittently

during yawning. About 2 years later, the clicking sound became more distinct and was associated with pain. Because these symptoms progressed, she visited the Department of Oral Surgery at our hospital. She was referred to us because of the presence of malocclusion.

She complained of spontaneous pain that extended from the right side to the top of her head, and pain on pressure was also observed at the left TMJ and the inferior belly of the right lateral pterygoid muscle.

On the frontal facial view (Figure 1B), the mandible appeared to be shifted slightly to the

Figure 1A-B
Pretreatment facial photos, 27 years 8 months.

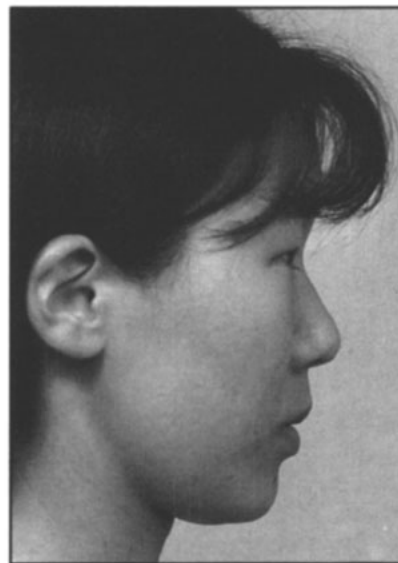


Figure 1A



Figure 1B

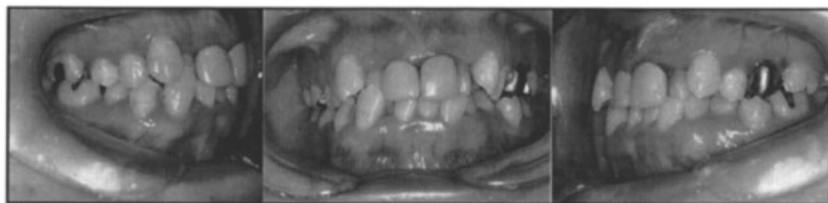


Figure 2A

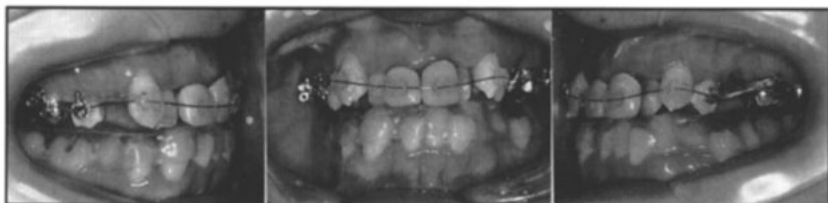


Figure 2B

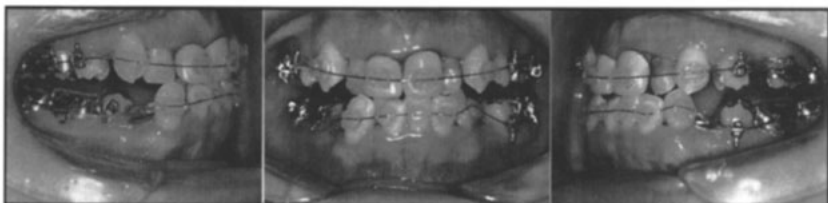


Figure 2C

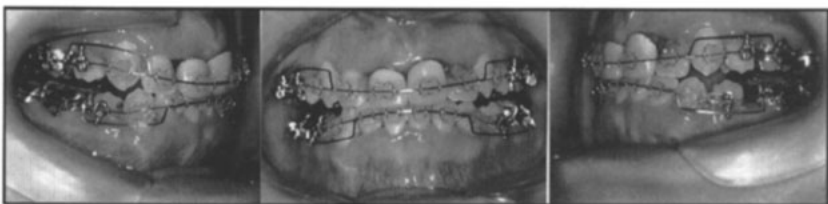


Figure 2D

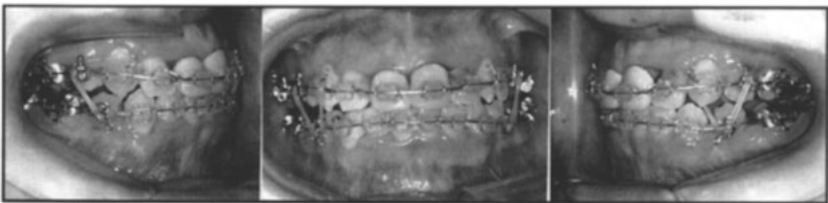


Figure 2E



Figure 2F

Figure 2A
Pretreatment intraoral photos.

Figure 2B
Orthodontic treatment in the maxillary arch was started after recapture of the disc, 27 years 11 months.

Figure 2C
Orthodontic treatment in the mandibular arch was started, 28 years 2 months.

right. The maxillary and mandibular anterior teeth were crowded, and the right and left lateral incisors were in crossbite (Figure 2A). The mandible was shifted to the right and the mandibular incisors were inclined to the left.

She could open her mouth 47 mm, and clicking was audible at 31 mm; a closing click (non-audible) was noted near the intercuspal position.

Stomatognathic functional analysis

Right border movement was limited, and she could not open her mouth fully from the right shifted position (Figure 3A). The path of the jaw when opening and closing was curved to the right. At 31 mm opening, rapid change of the jaw opening speed and an opening click were observed on the lissajous figure (Figure 3B).

The condylar pathway, graphed on a computer-aided axiograph (CADIAX), showed the right condyle had an opening click at almost maximum opening and a closing click near the intercuspal position (Figure 4A).

Radiographic evaluation

The axially projected radiograph revealed a shifting of the mandible to the right (Figure 5A). The TMJ sagittal tomogram showed that the left condyle had a midfossa location while the right condyle was positioned posteriorly (Figure 6A).

Cephalometric evaluation (Figure 7A) revealed an ANB angle of 2.0°, indicating a skeletal Class I problem. The FMA of 39.5° indicated a steep mandibular plane angle with increased lower facial height. There was, however, an acceptable incisor relationship.

Diagnosis and treatment objectives

This patient was diagnosed as having an Angle Class I malocclusion associated with a mandibular lateral shift. The crossbite of the lateral incisors caused this shift and may have contributed to the right TMJ internal derangement (anterior disc displacement with reduction).

Our treatment plan consisted of initial recap-

Figure 2D
A utility arch for depression of the incisors was used, 28 years 7 months.

Figure 2E
The splint was removed and vertical elastics were worn, 28 years 11 months.

Figure 2F
Posttreatment intraoral photos, 29 years 7 months.

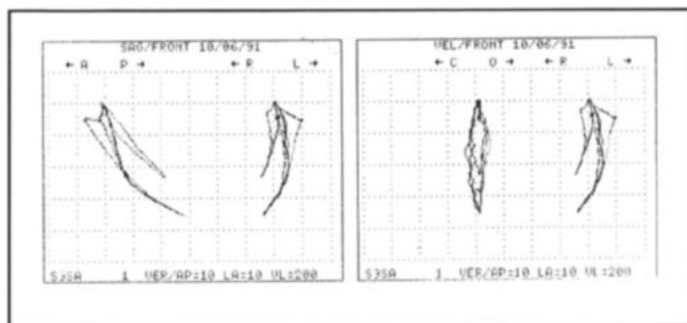


Figure 3A

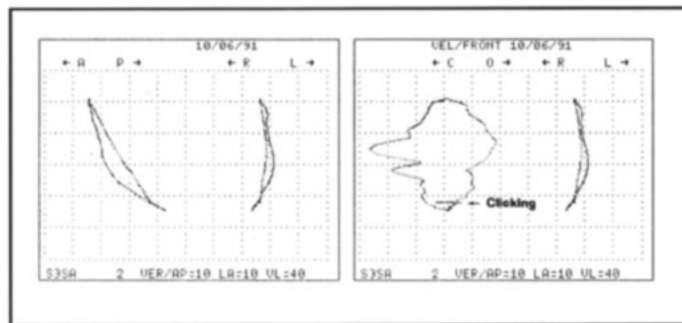


Figure 3B

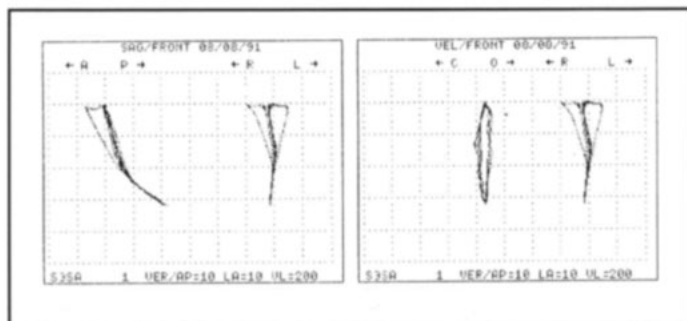


Figure 3C

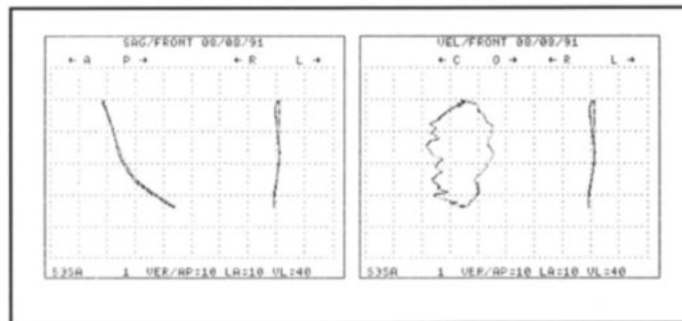


Figure 3D

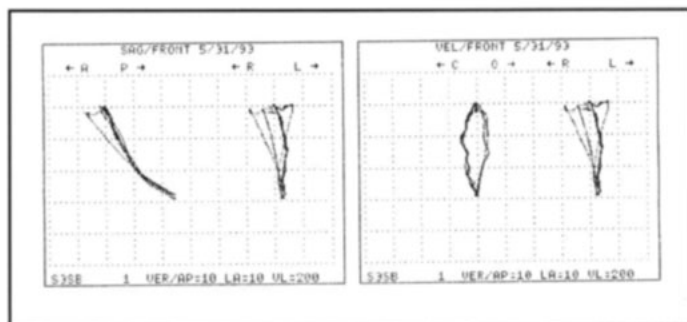


Figure 3E

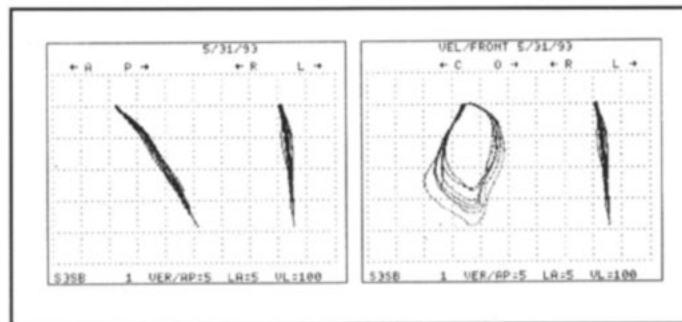


Figure 3F

ture of the disc with a splint, followed by orthodontic tooth alignment in the newly established mandibular relationship.

Treatment procedure

In the initial phase of treatment, recapture of the anteriorly displaced disc was attempted with an acrylic splint. In an effort to obtain a new therapeutic maxillomandibular relationship, the mandible was placed in the midline position after opening with clicking. One week after insertion of the splint, the patient complained of spontaneous pain in the right anterior temporal muscle. However, decreasing the vertical height of the splint completely relieved the symptoms 2 weeks later. Jaw movement at the incisors was smooth, and the opening-closing pathway was not curved (Figure 3D). Border movements were symmetrical and not limited (Figure 3C). Reciprocal clicking in the right TMJ with condylar movement was no longer observed, and the condyle moved more

Figure 3A
Pretreatment mandibular kinesiograph (MKG) showing jaw border movement.

Figure 3B
Pretreatment opening-closing jaw movement.

Figure 3C
MKG showing jaw border movement after splint therapy.

Figure 3D
MKG showing opening and closing jaw movements following splint therapy.

Figure 3E
Posttreatment MKG showing border movements of the jaw.

Figure 3F
Posttreatment MKG showing opening and closing jaw movements.

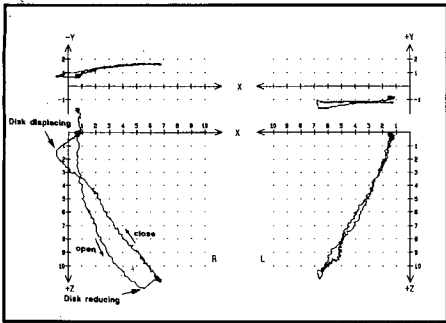


Figure 4A

Figure 4A
Pretreatment condylar movement (Computer-aided axiograph, CADIAX).

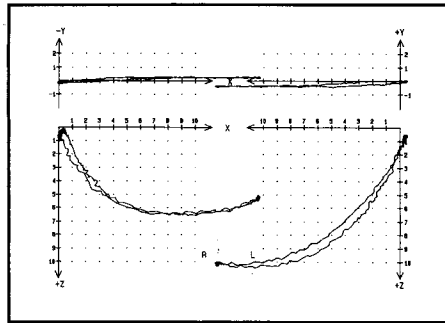


Figure 4B

Figure 4B
Condylar movement after splint therapy.

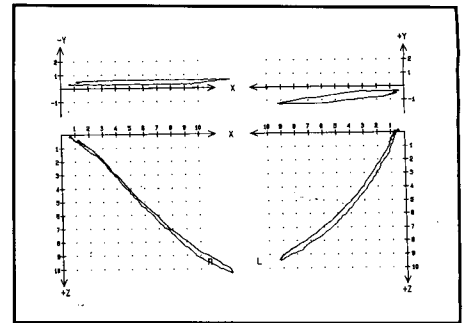


Figure 4C

Figure 4C
Posttreatment condylar movement.

Figure 5A
Pretreatment axial projected radiograph.



Figure 5A

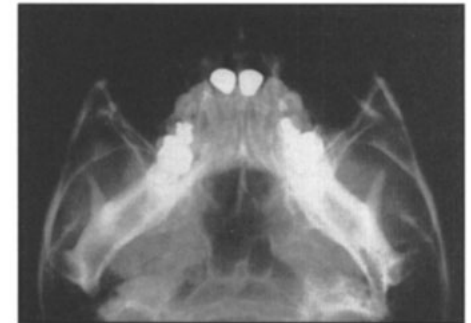


Figure 5B

Figure 5B
Posttreatment axial projected radiograph.

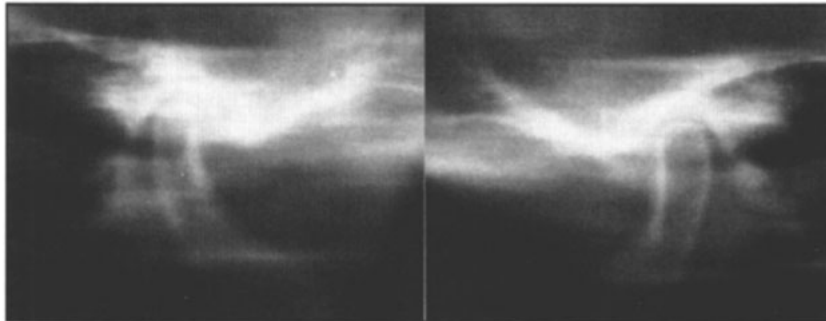


Figure 6A

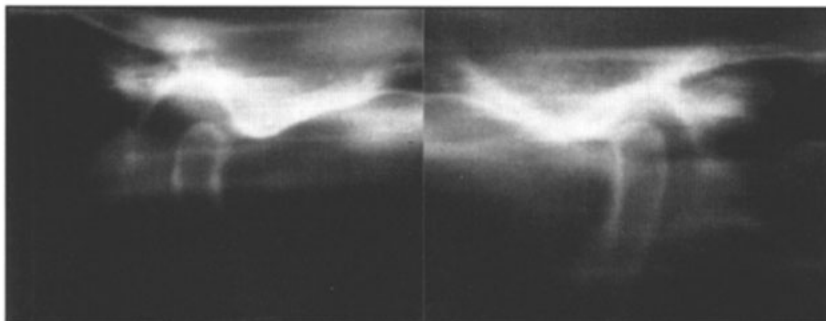
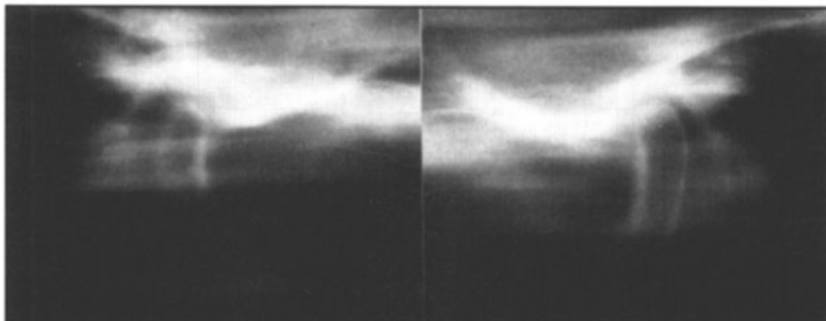


Figure 6B



anteriorly than it had at the initial examination (Figure 4B). However, inclination of the sagittal condylar path, because of the disc recapture, differed from that at the initial examination. The sagittal arthrotomogram revealed repositioning of both condyles inferiorly and anteriorly in the fossa (Figure 6B). Therefore, the height of the splint was decreased.

After disc recapture, the midline was corrected, but a posterior openbite was observed with occlusion only on the incisors. The second phase of treatment was designed to reconstruct the new therapeutic maxillomandibular position. To intrude the incisors and reduce the facial height we inserted a mandibular splint and placed fixed appliances on the maxillary teeth. To correct the anterior crowding, maxillary right first and left second premolars were extracted (Figure 2B). Three months later, the mandibular first premolars were extracted and dental alignment was initiated (Figure 2C).

Figure 6A
Pretreatment sagittal arthrotomogram.

Figure 6B
Sagittal arthrotomogram following splint therapy.

Figure 6C
Posttreatment sagittal arthrotomogram.

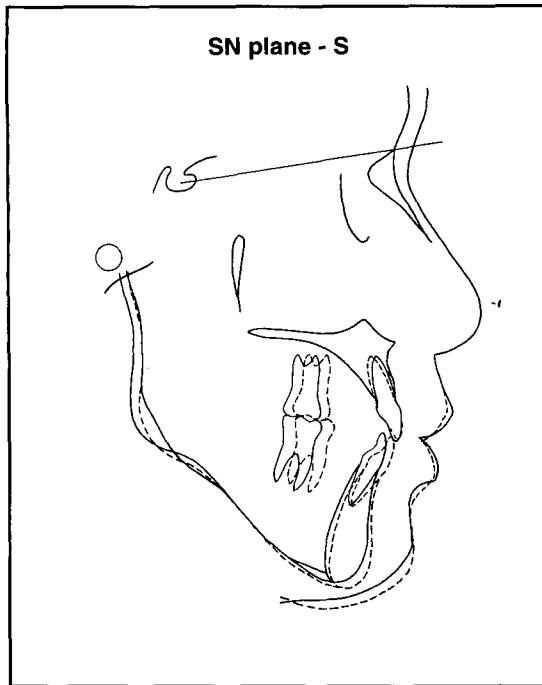


Figure 7A

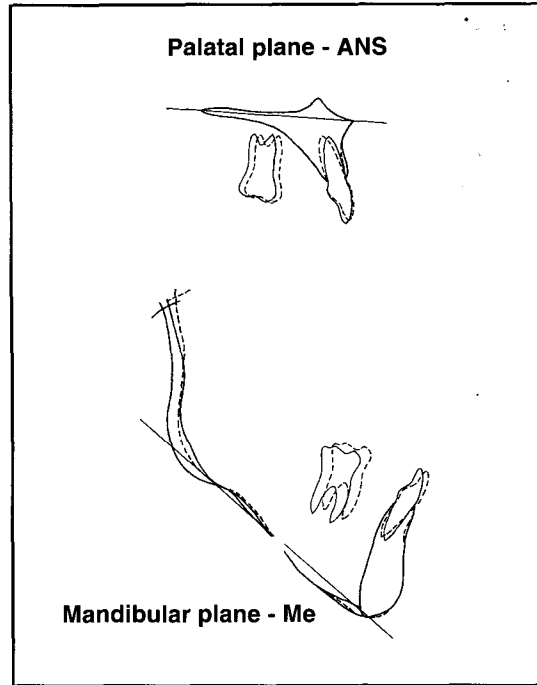


Figure 7B

Figure 7A-B
Superimposed cephalometric tracings. The dotted line is posttreatment.

Figure 8A-B
Posttreatment facial photos, 29 yrs 7 mo

At this time, the mandibular splint was reconstructed to move the incisors. After 8 months of active treatment, utility arches were used to depress the incisors (Figure 2D). Four months later the splint was removed, and vertical elastics were started (Figure 2E). After 20 months of active treatment, the fixed appliances were removed and the patient placed in retention (Figure 2F).

As a result of active treatment, the midline was corrected and good interdigitation obtained. The patient had no symptoms and did not complain of discomfort related to the TMJ. Jaw movement was smooth anteriorly (Figure 3E-F), the right and left sagittal condylar paths were almost the same, and differences in opening and closing movements had disappeared (Figure 4C). The left condylar head was in mid-position, while the right condyle was superior at the insertion of the splint and slightly anterior in the fossa (Figure 6C).

Cephalometric analysis and facial photographs gathered after treatment showed that the chin was prominent (Figures 7- 8). ANB had decreased from 2.0° to 1.0°, and the position of the mandibular incisors was more lingual to compensate for the skeletal change (Figure 7B). FMA decreased to 38.0° because of the mandibular anterior repositioning. The double margin of the mandibular body origi-



Figure 8A

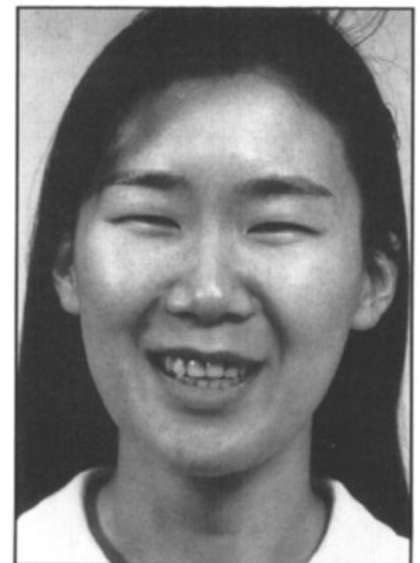


Figure 8B

nally observed on the lateral cephalogram and the mandibular shift on the axial projected headplate disappeared (Figure 5B).

Conclusion

Stomatognathic functional examination is very effective in the diagnosis of patients with all types of TMD, including internal derangement. The combination of a variety of examination procedures is helpful when planning treatment for TMD patients.

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