

The Natural Course of Nonreducing Disc Displacement of the TMJ: Relationship of Clinical Findings at Initial Visit to Outcome After 12 Months Without Treatment

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The natural course of untreated nonreducing disc displacement of the temporomandibular joint was evaluated in 52 patients (total of 57 affected temporomandibular joints). The association between the clinical findings at the initial visit and the outcome at 12 months for the age, range of motion for maximum mouth opening, intercuspal-occlusal relationship, morphology of the mandibular fossa and the articular eminence, and the locking duration was evaluated. Good resolution was seen in 59.6% of the patients. The patients with good resolution were significantly younger than those with poor resolution ($P < .05$, two-tailed t test); however, there were no differences in any other factors between the patients with good resolution and those with poor resolution. Natural resolution of clinical signs and symptoms was suggested for the majority of patients with nonreducing disc displacement of the TMJ, and a younger age at the initial visit appears to be a positive factor in the prognosis.

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Nonreducing disc displacement of the temporomandibular joint (TMJ) has been treated with medication, with an occlusal splint appliance with or without manual repositioning, with surgery, and with physical therapy, usually with reported success. For some patients, when the displacement is left untreated, symptoms nevertheless improve spontaneously. Some studies,^{1,2} including an earlier one by the present authors,³ report the spontaneous alleviation of signs and symptoms of nonreducing TMJ disc displacement in a large proportion of the cases. However, the factors that may affect the prognosis in this disorder remain obscure. The purpose of this investigation was to identify factors influencing the prognosis of untreated nonreducing disc displacement of the TMJ.

Materials and Methods

The study population included 52 patients (4 male and 48 female) who had been diagnosed with nonreducing disc displacement of the TMJ, but had not undergone any treatment for at least 12 months. The patients' mean age was 28.6 years (range 13 to 58

years). Forty-seven patients were diagnosed with a unilateral condition, and 5 with a bilateral condition. Nonreducing disc displacement was clinically diagnosed from a history of clicking followed by a limitation of mouth opening without clicking. Presence of nonreducing disc displacement was confirmed in all patients at the initial visit by both arthrography and magnetic resonance imaging (MRI). The average interval from the appearance of a limitation of mouth opening without clicking to the initial visit (locking duration) was 7.7 months (range 0.07 to 60 months). Patients were enrolled in this study if they met the following criteria: (1) constant or frequent pain of the TMJ or a range of motion of less than 35 mm at the initial visit; (2) no previous TMJ treatment; (3) agreement to conservative observation without any treatment; and (4) a follow-up observation after a 12-month period. The condition of the disc at 12-month follow-up was not necessarily examined in all patients.

Evaluation of Clinical Signs and Symptoms

The extent of maximal mouth opening and lateral excursion to the affected and unaffected sides, noise of the TMJ, and tenderness of the TMJ and masticatory muscles were thoroughly documented at the initial visit and at the 12-month follow-up. The interincisal distance at active full mouth opening was measured as a range of motion for maximum mouth opening. Noise of the TMJ and tenderness of the TMJ and masticatory muscles were evaluated by palpation. The clinical evaluation was conducted according to the criteria presented by the American Association of Oral and Maxillofacial Surgeons Ad Hoc Study Group on TMJ Meniscus Surgery.⁴ The criteria for full clinical resolution were as follows: (1) A range of motion greater than 35 mm for maximum mouth opening and greater than 5 mm for protrusive and lateral excursions; (2) the absence of pain or pain so mild, brief, and infrequent as to be of no concern to the patient; (3) a regular diet that at worst avoids tough or hard foods; (4) minimum inconvenience to the patients by diet; and (5) no severely degenerative radiographic changes. Good resolution was defined as absence of pain and a range of motion more than 35 mm for maximum mouth opening. Poor resolution was defined as constant or frequent pain, or a range of motion less than 35 mm for maximum mouth opening.

Analysis of Relationship Between Clinical Findings at Initial Visit and Prognosis

The following variables were tested against the outcome: age at the initial visit; range of motion for maximum mouth opening at the initial visit; locking duration; intercuspal-occlusal relationships; morphology of the mandibular fossa and the articular eminence (mandibular fossa length, depth, depth-length ratio, and angle of the posterior slope of the articular eminence). Data were compared for patients who showed good resolution and those who showed poor resolution at the 12-month follow-up examination.

The following intercuspal-occlusal relationships were assessed: overbite 5 mm or more; overbite 1 mm or less; overjet 5 mm or more; overjet 1 mm or less; and anterior open bite, defined as molar occlusion without anterior or premolar teeth contact.

The morphology of the mandibular fossa and the articular eminence was measured according to a method described previously.⁵

Differences in age at the initial visit, range of maximum mouth opening at the initial visit, locking duration, mandibular fossa length, depth and depth-length ratio, and angle of the posterior slope of the articular eminence were evaluated with a two-tailed *t* test. Chi-square tests were used to assess differences in intercuspal-occlusal relationships.

Results

Evaluation of Clinical Signs and Symptoms

According to the criteria for clinical resolution, 31 patients (59.6%) showed good resolution, and 21 (40.4%) poor resolution (Table 1). Changes of clinical signs and symptoms in both good resolution and poor resolution groups during the 12-month interval are shown in Table 1.

Analysis of Relationship Between Clinical Findings at the Initial Visit and Prognosis Age. The patients in the good resolution group (25.5 ± 10.82 years) were younger at the initial visit than those in the poor resolution group (33.0 ± 9.93 years) ($P < .05$) (Table 2).

Range of Motion for Maximum Mouth Opening. There was no difference between the two groups in the range of motion for maximum mouth opening at the initial visit (30.3 ± 7.41 mm and 28.3 ± 6.88 mm in the good and in the poor resolution groups, respectively) (Table 2).

Table 1 Changes in Clinical Signs and Symptoms

| Clinical signs and symptoms | Good resolution group (N = 31) | | Poor resolution group (N = 21) | |
|--|-----------------------------------|-----------------------|-----------------------------------|-----------------------|
| | At initial visit | At 12-month follow-up | At initial visit | At 12-month follow-up |
| Mean range of motion for maximum mouth opening (mm) | 30.3 ± 7.41 | 41.5 ± 4.51 | 28.3 ± 6.88 | 31.5 ± 7.61 |
| Mean lateral excursion to the affected side (mm) | 6.6 ± 2.31 | 7.4 ± 1.78 | 7.3 ± 2.39 | 7.4 ± 1.90 |
| Mean lateral excursion to the unaffected side (mm) | 5.8 ± 2.31 | 7.7 ± 1.46 | 6.4 ± 1.98 | 5.9 ± 1.83 |
| Frequencies of tenderness of the TMJ | 29 (93.5) | 0 (0) | 16 (76.2) | 12 (57.1) |
| Frequencies of crepitus of the TMJ | 4 (12.9) | 10 (32.3) | 6 (28.6) | 6 (28.6) |
| Frequencies of tenderness of the masticatory muscles | 10 (32.3) | 0 (0) | 8 (38.1) | 2 (9.1) |

Percent frequencies in parentheses.

Table 2 Patient History

| | Good resolution group (n = 31) | Poor resolution group (n = 21) |
|---|--------------------------------|--------------------------------|
| Age at initial visit (y)* | 25.5 ± 10.82 | 33.0 ± 9.93 |
| Locking duration (mo) | 7.9 ± 13.02 | 7.4 ± 12.52 |
| Range of motion for maximal mouth opening at initial visit (mm) | 30.3 ± 7.41 | 28.3 ± 6.88 |

* $P < .05$.

Table 3 Occlusal Signs

| Tested intercuspal-occlusal relationship | Good resolution group (n = 31)* | | Poor resolution group (n = 21)* | |
|--|---------------------------------|-----------|---------------------------------|-----------|
| | Present | Absent | Present | Absent |
| | 17 (54.8) | 14 (45.2) | 11 (52.4) | 10 (47.6) |
| Overjet ≥ 5 | 4 (12.9) | | | 4 (19.0) |
| Overjet ≤ 1 | 2 (6.5) | | | 0 (0) |
| Overbite ≥ 5 | 6 (19.4) | | | 1 (4.8) |
| Overjet ≤ 1 | 2 (6.5) | | | 2 (9.5) |
| Anterior open bite | 3 (9.7) | | | 3 (14.3) |
| Crossbite | 4 (12.9) | | | 2 (9.5) |

*Some patients exhibited more than one parameter of intercuspal-occlusal relationship. Percent frequencies in parentheses.

Locking Duration. There was no difference between the two groups in the locking duration (7.9 ± 13.02 months and 7.4 ± 12.52 months, respectively) (Table 2).

Intercuspal-Occlusal Relationships. There was no difference between the two groups in the preva-

lence of intercuspal-occlusal relationships (Table 3).

Morphology of the Mandibular Fossa and the Articular Eminence. There were no differences between the two groups in mandibular fossa length, depth, depth-length ratio, or angle of the posterior slope of the articular eminence (Table 4).

Table 4 Morphology of the Mandibular Fossa and the Articular Eminence

| | Good resolution group (n = 31) | Poor resolution group (n = 21) |
|---|--------------------------------|--------------------------------|
| Mandibular fossa length (mm) | 18.4 ± 1.65 | 18.9 ± 1.53 |
| Mandibular fossa depth (mm) | 6.50 ± 1.26 | 6.95 ± 1.54 |
| Depth-length ratio | 0.69 ± 0.226 | 0.64 ± 0.18 |
| Angle of the posterior slope of the articular eminence θ (degrees) | 32.0 ± 5.99 | 33.7 ± 7.25 |
| Angle of the posterior slope of the articular eminence ψ (degrees) | 46.7 ± 7.06 | 48.6 ± 8.22 |

Discussion

Lundh et al¹ and Kurita et al² observed that approximately two-thirds of the patients with untreated nonreducing disc displacement of the TMJ showed spontaneous resolution of the clinical signs and symptoms at 12 months after diagnosis. Our results agree. However, earlier studies differed from the present study in that testing for possible factors that might affect the prognosis of the natural course of nonreducing disc displacement of the TMJ was not performed.

We found that the patients with good resolution were significantly younger at the initial visit than those with poor resolution. Therefore, age in the patients with nonreducing disc displacement of the TMJ may be one of the factors associated with the prognosis in this disorder.

This study confirmed the finding by others^{6,7} that the range of maximum mouth opening at the initial visit was not associated with the outcome in untreated patients with nonreducing disc displacement of the TMJ. The same studies^{6,7} suggested that patients with shorter locking duration were more likely to benefit from conservative therapies. We found no difference in locking duration between patients with good and those with poor outcome; however, diagnosis of locking duration itself was determined by questioning patients retrospectively, which made this data too unreliable to be included in this study.

There have been many studies in which the association of intercuspal-occlusal relationships to signs and symptoms of TMJ was examined. There are some reports of an association between TMJ symptoms and overbite. Seligman and Pullinger⁸ reported that large (≥ 5 mm) overbite was associated with muscle pain in a nonpatient survey, but reported no association between overbite and orofacial pain in a later patient study.¹⁶ Lieberman et al,⁹ Riolo et al,¹⁰ and Williamson¹¹ also found a positive correlation between large overbite and

pain of the TMJ and masticatory muscles. On the other hand, Gunn et al,¹² Mohlin et al,¹³ and Egermark-Eriksson et al¹⁴ reported no association between TMJ symptoms and overbite.

Several studies also report an association between overjet and TMJ symptoms. Mohlin et al¹³ reported that large overjet was positively correlated with symptoms of the TMJ in Swedish men. On the other hand, Lieberman et al,⁹ Gunn et al,¹² Seligman and Pullinger,⁸ and Runge et al¹⁵ failed to show any relationship between TMJ symptoms and overjet, although Seligman et al, in a later, more definitive study,¹⁶ showed associations of TMJ disease to large overjet. It is also controversial whether anterior open bite^{9,10,13,16,17} or crossbite^{9,10,13-15,17} is associated with TMJ symptoms, although these factors are often associated with TMJ disease,¹⁸ but not with disc displacement without reduction. We found no relationship to these factors in this study, in agreement with those studies that evaluated this single TMJ disease group.

A relationship between disc displacement of the TMJ and the morphology of the mandibular fossa or the articular eminence has been reported. Kerstens et al¹⁹ observed that the posterior slope of the articular eminence in joints with anterior disc displacement was steeper than that in normal control joints without dysfunction, and suggested that a steep posterior slope of the eminence appeared to be one of the factors associated with disc displacement. We found the same association in an earlier study.⁵ In the present study, we tested whether the morphology of the mandibular fossa and the articular eminence was associated with the outcome in untreated nonreducing disc displacement of the TMJ. We found no differences between groups with good and poor resolution in mandibular fossa length, depth or depth-length ratio, or in the angle of the posterior slope of the articular eminence. These measurements thus may not be useful for prognosis if the findings of the current study are validated.

Our earlier study³ examined the clinical signs and symptoms in the patients with nonreducing disc displacement of the TMJ without any treatment at 6-month, 12-month, and 18-month follow-up. The results showed that the prevalence of patients with good resolution increased at the later follow-up. Therefore, we believe that the improvement was true, and not merely a change in the symptoms.

Lundh et al¹ has suggested that, because there was a possibility of spontaneous resolution, the initial treatment should be limited to nonaggressive measures such as counseling and medicines. We agree. However, we think that because only 59.6% of the patients with nonreducing disc displacement of the TMJ who did not receive any treatments during 12 months experienced good resolutions, other treatment modalities may be appropriately considered for the 40% who experienced poor resolution.

Conclusions

In our study, a possibility of spontaneous resolution of clinical signs and symptoms in the natural course of nonreducing disc displacement of the TMJ was suggested. While various clinical and morphometric parameters were not related to the outcome at 12 months after diagnosis in the natural course of nonreducing disc displacement of the TMJ, younger patients appear to have a better prognosis.

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Resumen

El Curso Natural del Desplazamiento del Disco No Reducido de la Articulación Temporomandibular: Relación entre los Hallazgos Clínicos de la Visita Inicial y los Resultados Después de 12 Meses Sin Tratamiento

El curso natural del desplazamiento del disco no reducido, no tratado, de la articulación temporomandibular (ATM) fue evaluado en 52 pacientes (con un total de 57 ATM afectadas). Se evaluó la asociación entre los hallazgos clínicos de la visita inicial y los resultados a los 12 meses, en cuanto a la edad, extensión del movimiento de la apertura bucal máxima, relación intercuspeada y oclusal, la morfología de la fosa mandibular y la eminencia articular, lo mismo que la duración del cierre. Se observó buena resolución en el 59,6% de los pacientes. Los pacientes que tenían buena resolución eran significativamente más jóvenes, que aquellos con una resolución pobre ($P < 0,05$, prueba de t de doble extremidad); sin embargo, no hubo diferencias en ninguno de los otros factores entre los pacientes con buena resolución y aquellos con una resolución pobre. Se indicó que la resolución natural de los signos y síntomas clínicos en la mayoría de los pacientes con desplazamiento del disco de la ATM no reducido, y la edad más temprana de los participantes en la visita inicial; parece ser un factor positivo para el pronóstico.

Zusammenfassung

Natürlicher Verlauf nicht reponierbarer Diskluxation des Temporomandibulargelenks: Beziehung zwischen den klinischen Befunden bei der ersten Untersuchung und Behandlungserfolge

Wir untersuchten den natürlichen Verlauf nicht reponierbarer Diskluxation des Temporomandibulargelenks (temporomandibular joint = TMJ) bei 52 Patienten (insgesamt 57 betroffene TMJ) und die Beziehung zum Behandlungserfolge nach 12 Monaten anhand der folgenden Parameter: Alter, Bewegungsbreite für die maximale Mundöffnung, intercuspidale Okklusion, Morphologie der mandibulären Fossa und artikulare Vorwölbung bei der ersten Untersuchung sowie die Dauer des Trismus.

Gute Behandlungserfolge wurden bei 59,6 % der Patienten beobachtet. Die Patienten mit guten Behandlungserfolgen waren wesentlich jünger als die mit schlechten Erfolgen ($p \leq 0,05$, zweigeteilter t -Test). Bei den anderen Parametern fanden sich keine signifikanten Unterschiede zwischen den Patienten mit guten und schlechten Behandlungserfolgen. Natürliche Linderung der klinischen Zeichen und Symptome sollte bei der Behandlung nicht reponierbarer Diskluxation des Temporomandibulargelenks in Betracht gezogen werden und das Alter bei der ersten Untersuchung scheint ein mit der Prognose im Zusammenhang stehender Faktor zu sein.

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