

Efficacy of Self-manipulation Technique in the Treatment of Patients with Anterior Disc Displacement without Reduction

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Internal derangement of the temporomandibular joint(TMJ) is defined as an abnormal relationship of the articular disc to the condyle. Mandibular manipulation is one of the conservative treatments to be considered first to manage the patients with anterior disc displacement without reduction.

Mandibular manipulation is used to increase articular mobility and to restore the displaced disc into an anatomically normal position. While Farrar's technique has been popularly used, Minagi et al., Mongini and Suarez introduced the manipulation technique conducted by the patients themselves. But there is no study on the efficacy of self-manipulation technique, comparing with conventional one.

The aim of this study was to investigate the efficacy of the conventional and self-manipulation technique, which was modified to complement the previously described technique by Minagi et al., in the treatment of patients with anterior disc displacement without reduction.

TMD patients, who visited Department of Oral Medicine of Seoul National University Dental Hospital from December, 2002 to November, 2004 and were diagnosed as anterior disc displacement without reduction by TMJ magnetic resonance imaging (MRI) were enrolled. Conservative treatments including physical therapy, exercise, behavioral therapy, stabilization splint therapy, and manipulation therapy were done to every single patient until the symptoms improved enough to discharge the patient. The charts were reviewed retrospectively according to the type of manipulation.

In the results, patients whose maximum mouth opening was more than 40 mm was higher in the self-manipulation group(69.9%) than in the conventional manipulation group(42.9%). But difference between two groups was not significant.

According to the fact that we decided to discharge the patients when their mouth opening increased to more than 40 mm and subjective symptoms such as pain and discomfort were improved as well, treatment period of discharged patients was significantly shorter in the self-manipulation group(29.2 ± 12.3 weeks) than in the conventional manipulation group (61.0 ± 38.0 weeks) ($p < 0.01$).

In conclusion, in the treatment of TMD patients with anterior disc displacement without reduction, the self-manipulation technique which is performed by patients themselves is an effective treatment modality for increasing the range of mouth opening and shortening the total treatment period.

Key words: Temporomandibular disorders(TMD), Anterior disc displacement without reduction, Manipulation

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I. INTRODUCTION

Internal derangement of the temporomandibular joint(TMJ) is defined as an abnormal relationship of the articular disc to the condyle, which occurs usually in the way that the disc displaces antero-medially or anteriorly. Anterior disc displacement(ADD) has been classified functionally as displacement with or without reduction. Anterior disc displacement without reduction, commonly known as closed lock, is generally accompanied by joint pain and limitation of mouth opening.

The goals for management of patients with anterior disc displacement without reduction included reducing pain, restoring normal function, especially for jaw opening, reducing the need for future health care, and restoring normal lifestyle functioning.¹⁾

A variety of techniques have been advocated for the treatment of anterior disc displacement without reduction. Generally, conservative treatments such as manipulation of the mandible, splint therapy, physical therapy, behavioral therapy, and pharmacological therapy are recommended first and invasive surgical treatments such as arthrocentesis, arthroscopic lysis, lavage and open surgery can be considered only when the conservative treatment has failed to resolve the disorder adequately.²⁾ Mandibular manipulation is one of the most conservative and effective treatments for patients with anterior disc displacement without reduction, and its usefulness has generally been accepted. Mandibular manipulation is used not only to increase articular mobility but also to restore the displaced disc into an anatomically normal position.³⁾

Mandibular manipulation has been accepted as the treatment as well as the diagnostic technique for anterior disc displacement without reduction.⁴⁾ Practically, considerable clinical success with mandibular manipulation has been reported³⁻¹⁰⁾ and several manipulation techniques have been described.¹¹⁻¹⁷⁾ Conventionally Farrar's technique⁵⁾ has been popularly used. But conventional

manipulation methods can be performed only by doctors, so that patients must visit the clinic for the manipulation therapy. To raise the clinical efficacy of therapeutic manipulation, a manipulation technique which can be done by patients is needed. Minagi *et al*, Mongini and Suarez have introduced the manipulation technique by patients themselves.¹²⁻¹⁴⁾ However, there is no study on the efficacy of self-manipulation technique, comparing with conventional one.

The aim of this study was to investigate the efficacy of the conventional and self-manipulation technique, which was modified to complement the previously described technique by Minagi *et al*. in the treatment of patients with anterior disc displacement without reduction.

II. MATERIALS AND METHODS

1. Subjects

Temporomandibular disorders(TMD) patients, who visited Department of Oral Medicine of Seoul National University Dental Hospital from December, 2002 to November, 2004 and were diagnosed as anterior disc displacement without reduction by TMJ magnetic resonance imaging (MRI) were enrolled. Conservative treatments including physical therapy, exercise, behavioral therapy, occlusal stabilization splint therapy, and manipulation therapy were done to every single patient until the symptoms such as limited mouth opening and subjective discomfort including pain improved enough to discharge the patient.

2. Chart review

The research protocol was approved by the institutional review board of the University Hospital. The charts were reviewed retrospectively. Treatment period, increase of mouth opening and alleviation of subjective symptoms according to the type of manipulation were investigated.

3. Manipulation technique

1) *The conventional manipulation technique*

Conventional manipulation technique was done as previously described by Farrar.⁵⁾ Force is applied downward on the most posterior tooth to distract the affected condyle downward. While pressing downward with the thumb or finger of one hand, we pull the chin upward with the other, firmly grasping the lower incisors and the lower border of the chin.¹⁷⁾

2) *The self-manipulation technique*

The manipulation technique introduced by Minagi et al. was modified. We instruct the patients to repeat 5 cycles and 3 times a day as follows.

- 1) Do the moist hot pack for 15 minutes.
- 2) Force the chin lightly backward.
- 3) Place the non-affected side thumb and forefinger on the ipsilateral maxillary canine and the contralateral mandibular canine respectively. Hold the affected side gonion with the other hand.
- 4) Move the jaw laterally to the non-affected side with the teeth slightly occluded. Support the movement with the fingers and confirm that the lateral excursive position is maximal and pay attention not to move the jaw forward.
- 5) Open the mouth along the lateral border of jaw movement on the non-affected side. Support this opening movement with the assisting fingers.
- 6) Continue to support the voluntary opening of the mouth to the maximal opening position.
- 7) Repeat the same procedure to the other side of the jaw.
- 8) Do the moist hot pack for 15 minutes again.

4. Statistics

Comparison between conventional manipulation group and self-manipulation group was performed using chi-squared test, Mann-Whitney U-test. The statistical software package was the SPSS 12.0 software for Windows (Microsoft Corp).

III. RESULTS

The self-manipulation group consisted of 23 patients (3 males, 20 females), aged between 18 and 61 years with a mean age of 35.9±13.4 years. The conventional manipulation group consisted of 14 patients (3 males, 11 females), aged between 15 and 66 years with a mean age of 29.9±15.4 years.

At the time of discharge, patients whose maximum mouth opening was more than 40 mm were 69.9% (16/23) in the self-manipulation group and 42.9% (6/14) in the conventional manipulation group. Although the self-manipulation group was likely to show more increase in the mouth opening, difference between two groups was not statistically

Table 1. Descriptive statistics of participating patients.

	Male	Female	Total
Self-manipulation group	3	20	23
Conventional manipulation group	3	11	14

Table 2. Difference in the maximum mouth opening between two groups at the time of discharge.

	≥ 40 mm	40 <mm	P value
Self-manipulation group	16 (69.6%)	7 (30.4%)	0.109
Conventional manipulation group	6 (42.9%)	8 (57.1%)	

* chi-square test

Table 3. Difference in the treatment period between two groups.

	Treatment period (weeks)	P value
Self-manipulation group	29.2±12.3	0.001
Conventional manipulation group	61.0±38.0	

* Mann-Whitney test

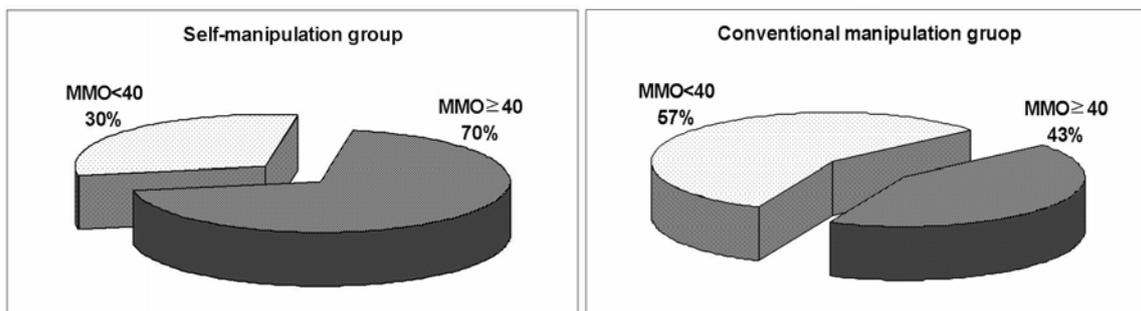


Fig. 1. The number of subjects whose maximum mouth opening range was over or below 40 mm at the time of discharge.

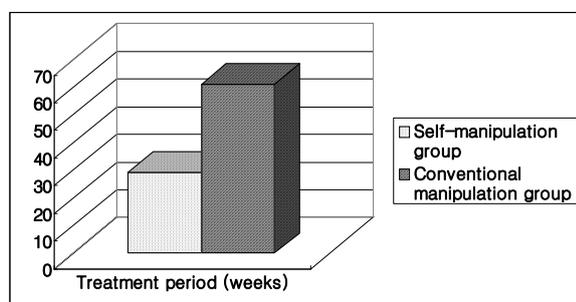


Fig. 2. Difference in the treatment period between two groups.

significant. (Table 2, Fig. 1) Treatment period was 29.2 ± 12.3 and 61.0 ± 38.0 weeks in the self-manipulation group and conventional manipulation group respectively. There was significant difference between the two groups ($p=0.001$). (Table 3, Fig. 2)

IV. DISCUSSION

It is commonly accepted that physical therapy, exercise, behavioral therapy, and occlusal stabilization splint therapy are general conservative treatment modalities for TMD patients with anterior disc displacement without reduction. Non-conservative treatments such as arthrocentesis, arthroscopic lysis, lavage, and open surgery have serious complications including post-operative pain, infection, facial nerve injury, and occlusal disharmony, etc.¹⁾ For conservative and non-conservative treatments seem to report similar success rates on a long term basis, it would appear

that a logical approach to patient management is to attempt conservative therapy first.²⁾ Occlusal stabilization splint therapy is widely used for patients with anterior disc displacement without reduction for reducing forces to the joint.²⁾ In previous studies on the treatment of anterior disc displacement without reduction, anterior repositioning splint after manipulation was generally recommended,^{4-8,11,13)} but the treatment with repositioning splint sometimes induces posterior open bite¹⁸⁾ and is contraindication for chronic cases.²⁾ The stabilization splint was able to accomplish many of the same goals as a repositioning splint.^{1,19)} Therefore, the stabilization splint was adopted for our treatment plan.

Mandibular manipulation is one of the conservative treatment modalities for the patients with anterior disc displacement without reduction to increase articular mobility and to restore the normal disc-condyle relationship, and its usefulness has generally been accepted. In the present study, both the conventional manipulation technique described by Farrar and the self-manipulation technique were performed.

According to Minagi *et al.*,¹²⁾ the manipulation technique done by the patients themselves is not competitive with the conventional manipulation technique, but has several unique properties. The conventional manipulation technique was usually used for acute cases, because success rate begins to decrease rapidly in patients with a longer history, and there is traumatic effect on the TMJ if

the technique fails to release locking.²⁾ On the other hand, the self-manipulation technique hardly has traumatic effect on the TMJ, because it is performed by little force of patient's own hand. Therefore this technique is worth trying for every patient with anterior disc displacement without reduction, in particular for recurrent or chronic cases. Moreover, this technique is so easy to master for both the dentist and the patient, as to be done frequently at home for raising the treatment efficacy. And this technique can be easily applied to the patient whose maximal jaw opening is severely limited, because placing a finger on the occlusal surfaces of the mandibular molars of the patient is not necessary.¹²⁾

In the present study, to increase the treatment efficacy, several steps were added to the original method previously described by Minagi *et al.*,¹²⁾ Mongini¹³⁾ and Suarez.¹⁴⁾ First, the mandible was moved backward passively first to gain the space for reduction of the disc. Second, the self-manipulation technique was performed not only on the affected side but also on the non-affected side. It can be postulated that application of manipulation on both side of TMJ could increase the range of the affected condylar movement and laxity of the affected muscles, stabilize the restored disc-condyle relationship, and balance both musculoskeletal systems. Third, moist hot pack therapy for 15 minutes before the manipulation was instructed to be done for relaxing, and moist hot pack therapy was repeated after manipulation for increasing the therapeutic efficacy.

In the results, patients whose maximum mouth opening is more than 40 mm are 69.9% in the self-manipulation group and 42.9% in the conventional manipulation group at the time of discharge. But difference between two groups was not significant. Regarding that the goals for management of patients with anterior disc displacement without reduction include not only mere increase of mouth opening but also various subjective symptoms, significant difference in total treatment period between two groups is very

meaningful result. It is thought that the period for alleviating all symptoms was shortened by trial of the self-manipulation technique in comparison with conventional manipulation technique. It can be assumed that daily practice of self-manipulation kept the patients more cognitive to their disorders and made behavioral control easier, which is well known to be very important for the treatment of TMD.²⁰⁾ So the self-manipulation technique, which is performed by patients every day according to the description, is more effective treatment than the conventional manipulation technique in the treatment of the patients with anterior disc displacement without reduction.

Collectively, in the treatment of TMD patients with anterior disc displacement without reduction, the self-manipulation technique which is performed by patients themselves is effective treatment modality for increasing mouth opening range and shortening the total treatment period. However, this study used MRI examination before the treatment only. To investigate the intra-articular effects more accurately after the treatment, post-treatment MRI examination should be performed in the future study and double-blinded controlled study and much larger sample size are also needed.

V. CONCLUSIONS

In the results, distribution of patients whose maximum mouth opening was more than 40 mm was higher in the self-manipulation group(69.9%) than in the conventional manipulation group(42.9%). But difference between two groups was not significant.

According to the fact that we decided to discharge the patients when their mouth opening increased to more than 40 mm and subjective symptoms such as pain and discomfort were improved as well, treatment period of discharged patients was significantly shorter in the self-manipulation group(29.2±12.3 weeks) than in the conventional manipulation group (61.0±38.0 weeks) ($p<0.01$).

In conclusion, in the treatment of TMD patients with anterior disc displacement without reduction, the self-manipulation technique which is performed by patients themselves is effective treatment modality for increasing the range of mouth opening and shortening the total treatment period.

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국문요약

비정복성 관절원판 전방변위 환자의 치료에 있어서 자가 수조작술의 효과에 대한 연구

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악관절 내장증은 관절과두와 관절원판이 이루는 복합체의 기능적 관계가 파괴되어 관절원판이 변위되는 것이다. 관절원판의 변위는 전내방으로의 변위가 가장 흔하며, 정복성 관절원판 변위와 비정복성 관절원판 변위로 나뉘어진다. 악관절 내장증 환자의 치료로는 교합안정장치, 물리치료, 운동요법, 행동요법 등의 보존적 치료법을 우선 고려하여야 하고, 충분한 기간 동안의 보존적 치료에도 증상의 변화가 적은 경우에 외과적 처치를 고려해 볼 수 있다.

악관절 수조작술은 앞서 언급한 보존적 치료법들과 함께 시행하는 보존적 술식으로 전방으로 변위된 관절 원판의 정복을 도모하고, 원판후조직의 적응을 유도하기 위해 시행한다. 전통적으로 Farrar의 방법을 널리 이용해왔으며, 이에 대한 많은 성공적 임상 사례들이 보고된 바 있고, 그 밖에도 몇몇 수조작법들이 소개된 바 있다. 그러나 전통적인 방법은 술자에 의해 이루어지는 것으로 환자가 병원에 내원할 경우에만 시행할 수 있어 수조작법의 치료 효과를 높이기 위해 환자가 스스로 시행할 수 있는 방법의 필요성이 제시되었다. Minagi, Mongini, Suarez 등은 환자 스스로 시행할 수 있는 수조작법을 소개한 바 있으나, 전통적인 수조작법과 비교한 자가 수조작법의 효과에 대한 연구는 현재까지 보고된 바가 없다.

본 연구에서는 Minagi, Mongini, Suarez 등에 의해 소개된 환자 스스로 시행할 수 있는 수조작법을 보완하여, 임상적으로 활용이 가능한 자가 수조작법을 소개하고 내원한 환자에 대하여 치과 의사가 직접 실시하는 전통적인 수조작법과 환자의 교육을 통해 환자 자신이 일상에서 시행하도록 한 자가 수조작법이 악관절 자기공명영상검사로 확진된 비정복성 관절원판 전방변위로 인한 개구제한 환자의 치료 성과에 어떠한 영향을 미치는지 알아보고자 하였다.

연구를 위해 구강내과에 2002년 12월부터 2004년 11월까지 측두하악관절장애로 진단 받은 환자 중 개구제한이 관찰되고 악관절 자기공명영상 검사에서 비정복성 관절원판 전방변위가 확진된 뒤 물리치료, 운동요법, 행동요법, 교합안정장치 및 수조작법을 시행하여 치료가 종결된 환자들을 대상으로 하였다. 초진시 환자는 개구제한과 함께 통증 등의 다양한 증상을 함께 호소하였고, 이에 따라 치료의 종결은 개구량의 증가와 더불어 환자의 주관적 불편감이 더 이상 존재하지 않아 내원을 중단할 수 있을 때로 결정하였다.

환자들의 의무 기록을 토대로 치료기간, 개구량의 증가, 주관적 증상의 개선 정도를 수조작법의 종류에 따라 후향 조사하였다. 전통적인 수조작법을 시행한 군과 변형된 자가 수조작법을 시행한 군의 차이를 분석하기 위하여 chi-squared test, Mann-Whitney U-test를 시행하였다.

치료 결과 개구량이 40 mm 이상으로 증가한 환자의 분포는 전통적인 수조작법을 시행한 군(42.9%)보다 자가 수조작법을 시행한 군(69.9%)에서 더 높은 경향을 보였으나, 그 차이가 통계적으로 유의하지는 않았다.

치료기간에 있어서는 치료의 종결 시점을 40 mm 이상의 개구량이 확보되고 환자가 초진시 호소한 주관적 불편감이 해소된 때로 하였고, 이에 따라 치료가 종결된 환자의 치료기간은 전통적인 수조작법을 시행한 군(61.0±38.0 주)보다 자가 수조작법을 시행한 군(29.2±12.3 주)에서 통계적으로 유의한 수준으로 짧았다. ($p < 0.01$)

결론적으로, 비정복성 관절원판 전방변위로 인한 개구장애 환자의 치료에 있어서 자가 수조작법의 시행은 환자가 수조작법을 교육받고 정해진 바에 따라 매일 시행하는 치료과정을 통해 개구량을 증가시킬 수 있고, 전통적인 수조작법에 비하여 전체적인 치료 기간을 단축시킬 수 있는 효과적인 치료법이라고 할 수 있다.

주제어: 측두하악관절장애, 비정복성 관절원판 전방변위, 수조작