The Effect of Chronic Temporomandibular Joint Dislocation: Frequency on the Success of Autologous Blood Injection

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Abstract Autologous blood injection (ABI) is a conservative, non-surgical method of treating chronic temporomandibular joint (TMJ) dislocation. Although many clinicians have reported positive results, procedural success has not been evaluated according to dislocation type. This study investigated the success of ABI on chronic TMJ dislocation with respect to dislocation frequency. ABI was used to treat 27 joints in 17 patients. The patients were divided into two groups based on dislocation frequency: (A) at least twice a week on different days and (B) at least twice a day. The procedure was successful in 13 of the 15 injected joints (86.6 %) in group A and six of the 12 injected joints (50 %) in group B. This difference was statistically significant ($p = 0.03814$). Autologous blood injection had limited success in patients with very frequent dislocation, while it was useful for treating less frequently dislocated TMJs.

Keywords Autologous blood injection · Chronic temporomandibular joint dislocation

Introduction

Temporomandibular joint (TMJ) dislocation occurs when one or both mandibular condyles are displaced in front of the articular eminence. In chronic recurrent TMJ dislocation, there is long term, repeated dislocation of the mandibular condyles [1–3].

Various pathological causes of chronic TMJ dislocation have been reported, including laxity of the TMJ ligaments, weakness of the TMJ capsule, insufficient eminence size, muscle hyperactivity, muscle spasm, and abnormal chewing activities. Each of these causes can occur alone or in combination [1–4]. Laxity of the joint capsule that is reinforced by the lateral ligaments is the main factor predisposing patients to chronic recurrent dislocation of the TMJ [5, 6]. In addition, the mechanism of dislocation is closely related to the morphology of the glenoid fossa, condyle, articular eminence, and zygomatic arch [6, 7].

Autologous blood injection (ABI) is a non-surgical, conservative method of treating chronic TMJ dislocation [1, 8, 9]. Although ABI has not gained much popularity in the management of chronic TMJ dislocation [10], many clinicians have reported successful results [1, 4, 8, 9]. Candirli et al. [9] stated that pain resulting from the traumatic effects of ABI caused patients to be reluctant to open their mouths to the critical size necessary for dislocation to occur, which allowed the joint to become more stable. In a recent animal study, investigators reported no structural changes or histopathological effects of the procedure [11].

However, studies have not evaluated ABI in patients with chronic TMJ dislocation in terms of the severity or frequency of dislocation [1, 4, 8, 9]. In addition, the reasons for ABI failure have not been identified. The question then remains as to whether ABI is an effective method for managing all types of chronic TMJ dislocations.

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This retrospective case control study evaluated the success of ABI according to dislocation frequency and possible pathophysiological causes.

Materials and Methods

Seventeen patients with chronic TMJ dislocation admitted to the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Karadeniz Technical University and Faculty of Medicine, Fatih University, between 2009 and 2011 were evaluated retrospectively. Patients were diagnosed with chronic recurrent TMJ dislocation based on clinical and radiographic findings. Panoramic radiographs were used to evaluate the relationship between the condyle and the articular eminence. All patients were scanned before and 1 month after the therapy with a 1.5 T MRI scanner (Achieva; Philips Medical Systems, Best, The Netherlands) using a multichannel head coil. The clinical examination consisted of measuring the maximum inter-incisal mouth opening and palpating both TMJs. In addition, a history of other disorders, such as disc displacement, osteoarthritis, and traumatic arthritis, was noted. Three patients had a history of disc displacement.

The study population included six males and 11 females, with a mean age of 35.9 ± 14.27 (range 17–74) years. The patients were divided into two groups based on dislocation frequency: (A) patients whose TMJ dislocated only when they yawned, ate, or opened their mouths widely for long periods, such as during dental treatment and (B) patients whose TMJ dislocated at least once a day with any motion of the mandible. In terms of the number of dislocations, the patients in group A had TMJs that dislocated at least twice a week on different days and those in group B had TMJs that dislocated at least twice a day.

Autologous blood injection was used to treat all of the patients. The procedure was performed under local anesthesia in an outpatient clinic, as previously described [1, 4, 6]. The skin overlying the TMJ was scrubbed with an antiseptic solution and local anesthesia was administered to the auriculotemporal nerve. The articular fossa was located at a point 10 mm anterior to the tragus of the ear and 2 mm inferior to the tragal-canthal line. Five ml of blood was withdrawn from the patient's antecubital fossa. With a 21-gauge needle, 4 ml was injected into the articular cavity and 1 ml was injected into the pericapsular tissues. After completing the injection, an elastic bandage was applied and left for 24 h to constrain the joint movements.

All patients were advised to restrict their joint movements and eat soft diets for 1 week.

All patients were followed for minimum of 6 months (6 months for three patients, 1 year for 14 patients). The patients visited the clinic every 2 weeks during the first

month and every 2 months for the rest of the year. Clinical parameters were evaluated at every visit.

Comparison of the success and failure rates between the groups was performed by means of Pearson chi-square test.

Results

Autologous blood injection was applied to 27 joints in 17 patients. There were 11 patients (seven females, four males) in group A and six patients (four females, two males) in group B. No complications such as infection were observed in any patient. Degenerative changes such as osteoarthritis or fibrous ankylosis were not observed radiologically or clinically during the follow-up period.

The treatment was successful in 19 of the 27 joints (70.3 %) and these patients remained healthy at the end of the 1 year follow-up (Table 1). When the results were evaluated according to the group, the procedure was successful in 13 of the 15 injected joints (86.6 %) in group A and six of the 12 injected joints (50 %) in group B. The treatment failed in both injected joints of one patient in group A and in three patients who underwent bilateral injection in group B, although the treatment was successful in one joint in one of these patients. Three patients underwent second injections; however, these injections were ineffective. Of the patients with unsuccessful results, there was a history of other TMJ disorders, such as disc displacement, in one of two joints in group A and three of six joints in group B.

Autologous blood injection had a greater success rate in group A than in group B and the difference was statistically significant ($p = 0.03814$, Pearson chi-square test; Table 2). One patient in group B subsequently underwent an eminectomy.

Discussion

Many surgical and non-surgical methods for treating chronic recurrent TMJ dislocation have been described [8, 9]. The surgical treatment of TMJ dislocation includes complications, such as altered sensation, facial nerve injury, and infection [1, 8].

Conservative approaches include physiotherapy, intra-articular sclerosing agent injection, and avoiding activities that cause extensive mouth opening [12]. Considering the possible occurrence of complications, such as facial nerve injury, non-surgical methods should be used before resorting to surgery whenever possible [8, 9]. Unfortunately, non-surgical treatment methods are not useful in all cases [8]. An alternative minimally invasive non-surgical method, namely ABI, has been developed [1, 4, 10, 12].

Table 1 Treatment results after autologous blood injection for groups A and B

	Gender	Age	Type	Treatment result
Group A				
1	F	48	Bilateral	Successful
2	F	52	Bilateral	Failed
3	F	24	Unilateral	Successful
4	F	33	Unilateral	Successful
5	F	25	Unilateral	Successful
6	F	41	Unilateral	Successful
7	F	38	Bilateral	Successful
8	M	43	Bilateral	Successful
9	M	27	Bilateral	Successful
10	M	38	Bilateral	Successful
11	M	30	Unilateral	Successful
Group B				
1	F	20	Bilateral	Failed
2	F	17	Bilateral	Failed
3	F	22	Bilateral	Successful
4	F	42	Bilateral	Failed
5	M	74	Bilateral	Successful
6	M	26	Bilateral	Successful in one joint

F female, M male

Table 2 Comparison of the treatment results between the groups

	Failed	Successful		<i>p</i> value
Group A	2 (13.3 %)	13 (86.6 %)	15 (100 %)	–
Group B	6 (50 %)	6 (50 %)	12 (100 %)	0.03814
Total	8 (29.6 %)	19 (70.3 %)	27 (100 %)	–

Chi-square and exact measures of association

ABI into the joint and pericapsular tissue results in fibrous tissue formation that limits mandibular motion [4, 8]. However, a study performed by Candirli et al. did not show fibrous tissue or structural changes in the joint space or pericapsular tissues [9, 11]. Consequently, it is not completely clear how the procedure prevents dislocation.

In 1973, Schulz first reported using ABI to successfully treat chronic dislocated TMJ in ten patients [13]. Daif showed that injecting ABI into the superior joint space and pericapsular tissues was more successful than injecting it into the superior joint space only (80 vs. 60 %) [8]. Similarly, Machon et al. reported an 80 % success rate with ABI into the superior joint space and pericapsular tissue in 25 patients with chronic recurrent TMJ dislocation [1]. Many other authors have treated chronic recurrent TMJ dislocation successfully using this technique [4, 10, 14].

In our study, the overall success rate using the same technique, i.e. injection into the superior joint space and pericapsular tissues and applying an elastic bandage for 24 h, was 70.5 %. The observed differences in the success rates among different studies might be related to different characteristics (severity and frequency) of the dislocations.

In a literature review, Akinbami reported the different types of TMJ dislocations and discussed the structural factors predisposing patients to dislocation [15]. Considering the predisposing factors, patients with different dislocation frequencies might have different responses to treatment. We found that the success rate was significantly higher ($p < 0.05$) in group A (at least twice a week on different days) than in group B (at least twice a day), i.e. the success of ABI decreased with an increased dislocation frequency. The findings for group A were consistent with published results [1, 8].

There is no established classification of chronic TMJ dislocation in terms of the frequency of occurrence. Machon et al. treated 25 patients diagnosed with recurrent dislocation using ABI [1]. Twenty of the patients had successful results and required no further treatment, while the remaining five patients continued to dislocate. These authors did not define the type of chronic TMJ dislocation in terms of the frequency in unsuccessful patients. Most authors noted that the patients had TMJ dislocations at least twice a week [8, 9]. The dislocation frequency in the patients that Daif treated ranged from three times a day to twice a week; however, he did not subdivide the patients into groups based on the frequency of dislocation [8]. In that study, two patients in the superior joint space group and one patient in the superior joint space and pericapsular tissue group started to redislocate 4 weeks after the ABI procedure. Similarly, the frequency of condyle redislocation was not examined in terms of the frequency of dislocation before ABI. Perhaps redislocation of the condyle and unsuccessful results are related to the initial dislocation frequency.

Triantafillidou et al. published their experience with 25 subluxation patients who underwent ABI [12]. In their study, 22 of 25 were treated successfully, while treatment success was moderate in three patients with histories of traumatic arthritis and disk displacement. Similarly, we had unsuccessful results in patients with history of other TMJ disorders. Therefore, we postulate that a history of any other TMJ disorder may be related to unsuccessful results in patients with hypermobility of the TMJ.

Many authors report that ABI of the TMJ is a simple, safe, and cost-effective technique for treating chronic TMJ dislocation [8, 12]. As compared with other nonsurgical and surgical techniques, ABI has the advantages of being repeatable, not requiring tissue dissection, and having fewer post-operative complications [8, 15]. The uncertain

nature of the pathophysiology of the procedure is the main disadvantage of ABI [9, 11]. Since the histopathological effects of ABI remain unclear, the fibrosis occurring after the procedure may not provide sufficient resistance to avoid dislocation in very frequently dislocated joints.

Based on our results, the benefits of ABI were limited for patients whose joints dislocated very frequently, while it was useful for treating less frequently dislocated TMJs and may be more effective for managing TMJ subluxations.

In addition, clinicians who decide to use ABI must consider the history of other TMJ disorders in patients with chronic TMJ dislocation. There is a need for further clinical and experimental studies to assess ABI in patients with very frequent TMJ dislocation.

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