



## Conservative treatment of recurrent temporomandibular joint dislocation with autologous blood injection

### Tekrarlayan temporomandibular eklem dislokasyonunun otojen kan ile konservatif tedavisi

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#### Abstract

**Aim:** Temporomandibular joint (TMJ) dislocation is very distressing condition and is common in society. TMJ may be treated by conservative methods but the cases with persistent may require surgical. Autologous blood injection (ABI) to TMJ is a nonsurgical method provides more effective outcomes compared to other methods and has been long studied in the literature. ABI is based on the injection of the blood drawn from the antecubital fossa into the superior joint space. The inflammatory changes develop in the joint and maturation of blood after the administration of ABI limit the mandibular movements. Eminectomy seems to provide a permanent solution for the surgical treatment of TMJ, it is a risky method since the mandibular area is neighbored by critical anatomical structures. Therefore conservative methods should be tried before initiating advanced surgical techniques.

**Materials and Methods:** This study included patients had a long history of 3 or more episodes of dislocation during daily activities (e.g. eating, drinking, laughing, and yawning), rejected undergoing surgery, and had no history of dislocation due to this complaint. Of these, 23 patients with TMJ dislocation underwent ABI to TMJ.

**Results:** At 1-year follow-up, no complication was observed in any patient and the complaints resolved in all but 2 patients.

**Conclusion:** We consider that autologous blood injection to TMJ is a useful to be used in the treatment of recurrent TMJ with no need for surgical treatment.

**Keywords:** Autologous blood injection; Temporomandibular Joint; Chronic Dislocation.

#### Öz

**Amac:** Temporomandibular Eklem (TME) dislokasyonu toplumda giderek sık görülen ve hasta için son derece rahatsız edici bir durumdur. Tedavisinde konservatif uygulamalar etkili olmakla birlikte inatçı durumlarda ileri cerrahi işlemler gerekebilmektedir. Fakat bu hastalar için kabul edilmesi zor bir karardır. Tedavisinde diğer konservatif uygulamalara göre çok daha etkili olan, otolog kan enjeksiyonu uygulaması ile ilgili çalışmalar çok eskiye dayanmasına rağmen, hakkında az sayıda çalışma bulunmaktadır. Otolog kan enjeksiyonu hastanın antecubital fossasından alınan kanın eklem boşluğuna enjeksiyonu temeline dayanan bir uygulamadır. Uygulama sonrası eklem bölgesinde meydana gelen enflamatuvar değişikliklerle kanın maturasyonu, eklem hareketliğini kısıtlamaktadır. Böylelikle hasta günlük faaliyetleri sırasında sıklıkla karşılaştığı bu rahatsız edici durumdan kurtulabilmektedir. Cerrahi tedavide eminektomi uygulaması kalıcı bir çözüm gibi görülse de bölgenin birçok önemli anatomik oluşumlara komşuluğu beraberinde riskleri getirmektedir. Bu nedenle TME'yi ilgilendiren hastalıklarda ileri bir cerrahi uygulamadan önce, tüm konservatif yollar düşünülmelidir.

**Gerec ve Yöntem:** Bu çalışmamızda günlük rutin faaliyetleri sırasında (yeme-içme, gülme, esneme vb..) eklemi üç veya daha fazla disloke olduğu anemnezini veren ve bu şikayeti uzun bir süredir mevcut olan, cerrahi tedaviyi kabul etmeyen ve daha önce bu şikayeti nedeniyle herhangi bir tedavi görmemiş hastalar dahil edildi. Çalışmamızda rekürrent TME dislokasyonu bulunan 23 hastanın eklem bölgelerine otolog kan enjeksiyonu yapılmıştır.

**Bulgular:** 1 yıllık takiplerinde herhangi bir komplikasyonla karşılaşmamıştır. 2 hasta dışında tüm hastalarda şikayetler geçmiştir.

**Sonuç:** Otolog kan enjeksiyonunun, rekürrent TME dislokasyonun'da cerrahi tedaviye geçilmeden, konservatif bir tedavi yöntemi olarak uygulanabileceğini düşünüyoruz.

**Anahtar Kelimeler:** Otolog Kan Enjeksiyonu; Temporomandibular Eklem; Kronik Dislokasyon.

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## INTRODUCTION

Temporomandibular joint (TMJ) dislocation is a condition commonly encountered in clinical practice and it is especially seen in emergency surgery patients. The TMJ becomes dislocated when the condyle becomes locked in front of a bony prominence called the articular eminence and cannot move back into its place. Chronic recurrent TMJ dislocation may result from everyday activities such as laughing and yawning. It may also occur during clinical events that require mouth opening for a long period of time such as during dental treatment or the procedures of general anaesthesia. The pathogenesis of TMJ dislocation comprises multiple factors, including limitations of the muscles and the capsular ligaments during chewing, an unusual eminence size, muscle spasms, trauma, and abnormal chewing movements (1).

According to Adekeye, TMJ dislocations are of three types: acute, chronic, and recurrent dislocations (2). For recurrent TMJ dislocations, several techniques including surgical and conservative methods have been suggested (3). Conservative methods include limitation of mandibular movements, applications of local anaesthetics, infiltration of botulinum toxin (Botox) into the chewing muscles, and injection of sclerosing agents (4, 5). The injection of sclerosing solutions around the joint capsule and/or into the articular cavity has been suggested as a non-surgical treatment method (6). However, widespread use of this method is restricted due to its adverse side effects (3).

As a method for the treatment of chronic recurrent TMJ dislocation, autologous blood injection (ABI) was first described by Brachmann in 1964 (7). This method was redefined by Machon et al. and some other clinicians over recent years (1, 8, 9). Schulz performed ABI in 16 patients with TMJ dislocations in 1973 and reported that no symptoms were observed in 10 patients during a 1-year follow-up period (10). Although ABI has been commonly used by numerous clinicians in the treatment of recurrent chronic TMJ dislocations (10, 11), this method has received little attention in the literature. Although there is no clear reason for this, this situation is primarily attributable to the fact that the injection of blood to the articular cavity leads to cartilage degeneration.

The pathophysiology of blood injection to TMJ is similar to that of bleeding in joints elsewhere in the body, such as the elbow or the knee (12). During the first few hours or days after the ABI procedure, an inflammatory reaction replaces the blood clotting (13). Additionally, inflammatory mediators released by platelets and the dead and injured cells cause oedema around the joint. This inflammatory response leads to limitation in joint movement. Additionally, a combination of an organised blood clot and the loss of fibrous tissue diminish joint mobility. Subsequently, the maturation of the fibrous tissue leads to a permanent limitation of joint movement (12). This process results in disturbance of cartilage matrix turnover, thus decreasing chondrocyte metabolism by causing localised contractions (13, 14).

Although favourable outcomes have been reported for the ABI method in the literature, studies have shown that conservative methods are not always successful. Thus, several surgical interventions have been suggested, including capsular plication, augmentation or reduction of the articular eminence, lateral pterygoid myotomy, condylectomy, and temporalis tendon scarification (15). In this study, we aimed to treat recurrent TMJ dislocation with autologous blood injection.

## MATERIALS and METHODS

The study was approved by Adiyaman University Biomedical Research Ethics Committee (2015/05-7). The study included 23 patients with chronic TMJ dislocation. Based on the radiographic and clinical criteria proposed by Nitzan (16), all patients were diagnosed as having chronic recurrent TMJ dislocation. The patients included four (17.4%) men and nineteen (82.6%) women. All had three or more episodes of dislocation every day. Patients with a history of surgery for TMJ and patients who had recently undergone treatment due to a complaint related to the TMJ were excluded. Some patients reported that their jaws sometimes became dislocated even during yawning and laughing and stated that they did not require advanced surgical intervention. The patients included in the study were informed about the steps and the risks of the surgical procedure.

### *Surgical Procedure*

All patients underwent autologous blood injection to the TMJ. First, each patient was asked to take a half-sitting position with his/her head turned to the side where the injection would not be performed. The ear and the preauricular region were cleansed and disinfected with povidone-iodine solution. The area around the surgical site was covered with sterile drapes. All procedures were performed under local anaesthesia. Auriculotemporal nerve block was performed with 0.3–0.5 mL of anaesthetic solution (containing Ultracaine DS 1/200,000 adrenaline). An 18-gauge needle was inserted 10 mm anterior to the tragus and 2 mm below the central tragus line. The superior joint cavity was entered by moving the needle superiorly and anteriorly until the tip of the needle reached the glenoid fossa. The patient was asked to open his/her mouth maximally, and 3 mL of saline was injected and then aspirated again. By doing so, the superior joint cavity was irrigated, and hydraulic pressure was created. Then, 3 mL of autologous blood was drawn from the antecubital fossa; 2 mL was injected into the superior joint cavity and 1 mL around the TMJ capsule.

### *Postoperative Care*

Following the ABI procedure, an extraoral jaw bandage was applied for a week. The patients were given a diet limited to soft foods that would allow them to perform minimal mouth opening. The patients were prescribed Tenoxicam (TX, 20 mg/1 mL, Tilcotil flacon, Roche, Istanbul, Turkey) for analgesics. For the first 2 weeks after the surgery, the patients wore the jaw bandage; they were instructed to restrict mouth opening to 20 mm, and were given a diet limited to soft foods. After 2 weeks, jaw exercises were initiated, and patients were instructed to perform the exercises in front of a mirror.

They wore the jaw bandage only while sleeping and continued their jaw exercises until jaw movements returned to normal.

### Statistical Analysis

Data were analysed using the SPSS software (ver. 15.0 for Windows; SPSS, Inc., IL, USA). Categorical variables are expressed as numbers and percentages, and numerical variables as means and standard deviations (SDs) or as medians. Because the number of patients per group was not appropriate for parametric tests, the independent variables were compared using the Mann-Whitney U-test. The dependent variables were analysed using the paired *t*-test because the differences between the numerical variables were non-normally distributed. The numerical variables were analysed using Pearson's

correlation coefficient because the correlations between these variables met the criteria for parametric tests. A *p*-value of <0.05 was considered to indicate statistical significance.

## RESULTS

The patients were 82.6% women and 17.4% men, and the overall mean age was  $32.7 \pm 9.6$  years. No significant difference was observed between the genders with regard to mean age ( $p = 0.096$ ). Pre- and postoperative ranges of maximal mouth opening (MMO) showed no significant difference with age ( $p = 0.568$  and  $0.328$ , respectively).

**Table 1.** Gender Ratios and Average Age of the Patients

	Total		Gender				<i>p</i>
			Female		Male		
	mean $\pm$ SD	median	<i>n</i>	%	<i>n</i>	%	
Age	$32.7 \pm 9.6$	32	19	82.6	4	17.4	0.096
	mean $\pm$ SD	median	mean $\pm$ SD	mean $\pm$ SD	mean $\pm$ SD	median	
	$32.7 \pm 9.6$	32	$31.2 \pm 9.4$	29	$39.8 \pm 8.2$	42	

**Table 2.** The relationship between age and preoperative/postoperative MMO range (mm)

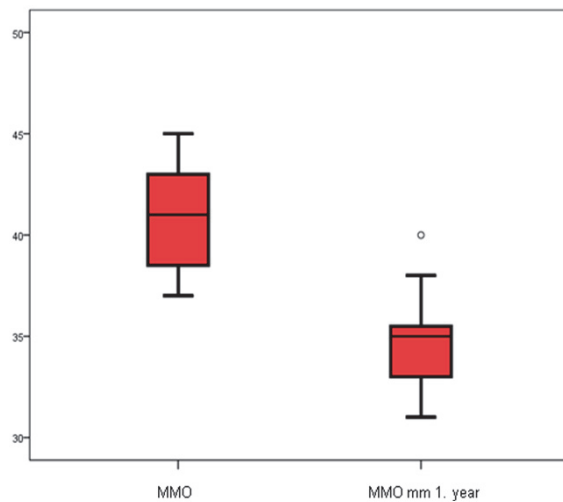
MMO range (mm)	Age	
	R	<i>p</i>
Preoperative	-0.126	0.568
Postoperative	-0.213	0.328

No significant difference was observed between genders in terms of pre- or postoperative MMO ( $p = 0.653$  and  $0.711$ , respectively). However, the decrease in MMO between pre- and postoperative

measures was significant ( $p < 0.001$ ); the mean decrease was  $6.6 \pm 2.5$  (range, 5.5–7.6) mm (95% confidence interval, CI). This decrease did not differ significantly between genders ( $p = 0.681$ ).

**Table 3.** Preoperative/Postoperative mean values and change MMO in gender groups

MMO range (mm)	Gender						<i>p</i>
	Total		Female		Male		
	mean $\pm$ SD	median	mean $\pm$ SD	median	Mean $\pm$ SD	median	
Preoperative	$41.0 \pm 2.8$	41	$40.8 \pm 2.7$	41	$41.5 \pm 3.7$	42	0.653
Postoperative	$34.4 \pm 2.1$	35	$34.3 \pm 2.1$	35	$34.8 \pm 2.8$	34.5	0.711
	mean $\pm$ SD	95% CI	mean $\pm$ SD	95% CI	Mean $\pm$ SD	95% CI	
MMO difference	$6.6 \pm 2.5$	5.5-7.6	$6.5 \pm 2.6$	5.3-7.8	$6.8 \pm 2.2$	3.2-10.3	0.681
<i>p</i>	<0.001		<0.001		<0.001		



**Figure 1.** TMJ dislocation was 95% healed in all but two (8.7%) patients ( $p < 0.001$ ).

## DISCUSSION

Autologous blood injection (ABI) to the temporomandibular joint (TMJ) is a simple and minimally invasive method used in the treatment of recurrent TMJ dislocation (8). The primary aim in ABI is to limit mandibular movement (8, 10).

Autologous blood injection to TMJ is performed by the injection of autologous blood into the pericapsular region and the superior joint cavity. The bleeding caused by the introduction of a needle for injection in the pericapsular region creates a local bed for the formation of fibrous tissue. Although the mechanism of the injection of blood into the superior joint cavity remains unknown, this injection is considered to trigger the formation of adhesion among the compartments. The limitation of the mandibular movements is of prime importance for successful treatment of TMJ dislocation. In several studies, intermaxillary fixation (IMF) has been performed as treatment for TMJ dislocations (10, 11). Joint scarring following the ABI procedure leads to fibrous tissue formation, thereby preventing recurrent condylar dislocation (8).

Brachmann achieved successful treatment in 60 patients using the method (7). Schulz also treated 16 patients in 1973 by performing autologous blood injection to the TMJ twice per week for 3 weeks. Subsequently, immobilisation was performed via IMF for 4 weeks. Schulz reported that the symptoms were resolved in 10 patients at the 1-year follow-up (10).

In our study, unlike that by Schulz, ABI was performed only once in all patients. We consider that performing ABI more than once may adversely affect the maturation process of the blood that was injected during the first injection and may cause a continued inflammatory reaction, leading to capsular degeneration and delayed maturation of the blood. In our study, TMJ dislocation healed in all but two patients, and an optimal mouth opening range was achieved in all the patients at 1-year follow-up, indicating a successful treatment.

Jacobi-Hermanns et al. treated 19 patients with TMJ dislocation using ABI and reported that the symptoms were resolved in 17 patients at the 18-month follow-up (17). In our study, patients were followed for 1 year. Additional studies with longer follow-up periods are needed to further contribute to the available findings on treatment for TMJ dislocation.

Machon et al. injected autologous blood into the bilateral superior joint cavities and the joint capsule in 25 patients with recurrent TMJ dislocation and achieved successful treatment in 20 patients at 1-year follow-up. (1) Our study was similar in terms of the length of follow-up periods.

Candirli et al. evaluated the effects of ABI in 14 patients using magnetic resonance imaging (MRI). The study compared the MRI images obtained preoperatively and at 1-month follow-up, and found that TMJ dislocation was healed in all patients at the 1-month follow-up (18).

Schulz injected autologous blood to the pericapsular region in 16 patients with TMJ dislocation and reported that the symptoms were resolved at the 1-year follow-up in ten patients, at the 2-year follow-up in seven, and at the 5-year follow-up in five patients (10).

Hasson et al. injected autologous blood into both the pericapsular region and the articular cavity and reported that subluxation was detected in only one of four patients. The authors also reported that a normal mouth opening range was achieved and the symptoms resolved in all patients during the follow-up period, which ranged from 1 to 3 years. They recommended the use of an elastic bandage in the first 24 hrs and limitation of mandibular movements for 7 days after surgery (8). In our study, we also performed several procedures to limit mandibular movements in the early postoperative period. We believe that such limitations are important in preventing tissue irritation caused by mechanical movements.

Daif investigated the effect of ABI on recurrent TMJ dislocations in 2010. That study divided patients into two groups based on the ABI procedure used. In Group A, autologous blood was injected to the superior joint cavity only, whereas in Group B, autologous blood was injected to both the superior joint cavity and pericapsular region. The study concluded that the success rate was higher in group B than in group A (19).

The method of autologous blood injection to the TMJ has several disadvantages. Because the ABI procedure is performed with a needle in a blinded fashion and without direct vision, the autologous blood may spread to unwanted areas. Second, advancement of the needle may lead to damage and bleeding in the surrounding tissues. Several studies have also shown that the advancement of the needle causes various changes in chondrocyte metabolism as well as degeneration in the perforated cartilaginous tissue during advanced stages of TMJ dislocation (14). However, other studies have suggested that these changes are temporary and cause no permanent damage at advanced stages (20).

Candirli et al. evaluated the histopathological effects of autologous blood injection to the TMJ in rabbits. They only found fibrin accumulation around the tissue samples, no degeneration in the joint cartilage or no formation of a fibrous bed at the injection site (21). Similarly, in our study, no complication arising from the ABI procedure was found in any patient.

Intermaxillary fixation (IMF), either alone or combined with an injection, can be used to prevent habitual TMJ dislocations. An immobilisation period of 3–6 weeks is recommended for treatment of TMJ dislocation (22). Because excessive mouth opening may lead to treatment failure and recurrence of TMJ dislocation, immobilisation has become an important issue in the treatment of TMJ dislocation.

In addition to ABI, several other non-surgical methods have been used in the treatment of chronic recurrent TMJ dislocation. Of these, injection of sclerosing agents has been shown to have several side effects, including facial nerve damage (23). Another method is infiltration of botulinum toxin (Botox), which has fewer side effects than does the use of sclerosing agents (24). Other methods include applications of occlusal splints, physiotherapy, and limitation of activities that cause excessive mouth opening (25, 26).

## CONCLUSION

Autologous blood injection to the TMJ is a simple, reliable, and cost-effective treatment method for patients with chronic recurrent TMJ dislocation. This method is advantageous because it requires no tissue dissection and leads to fewer postoperative complications compared with other methods. Moreover, this method can be easily performed under local anaesthesia in outpatient clinics, with no requirement for general anaesthesia or a hospital setting.

## REFERENCES

1. Machon V, Abramowicz S, Paska J, Dolwick MF. Autologous blood injection for the treatment of chronic recurrent temporomandibular joint dislocation. *J Oral Maxillofac Surg* 2009;67(1):114-9.
2. Adekeye EO, Shamia RI, Cove P. Inverted L-shaped ramus osteotomy for prolonged bilateral dislocation of the temporomandibular joint. *Oral Surg Oral Med Oral Pathol* 1976;41(5):568-77.
3. Moore JR (1985) *Surgery of the mouth and jaws*. Blackwell, Oxford, 622.
4. Aquilina P, Vickers R, McKellar G. Reduction of a chronic bilateral temporomandibular joint dislocation with intermaxillary fixation and botulinum toxin A. *Br J Oral Maxillofac Surg* 2004;42(3):272-3.
5. Matsushita K, Abe T, Fujiwara T. OK-432 (Picibanil) sclerotherapy for recurrent dislocation of the temporomandibular joint in elderly edentulous patients: case reports. *Br J Oral Maxillofac Surg*. 2007;45(6):511-3.
6. McKelvey L. Sclerosing solution in the treatment of chronic subluxation of the temporomandibular joint. *J Oral Surg* 1950;8(3):225.
7. Brachmann F. Autologous blood injection for recurrent hypermobility of the temporomandibular joint. *Dtsch Zahnarztl Z* 1964;15:97-102.
8. Hasson O, Nahlieli O. Autologous blood injection for treatment of recurrent temporomandibular joint dislocation. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endod* 2001;92(4):390-3.
9. Kato T, Shimoyama T, Nasu D, Kaneko T, Horie N, Kudo I. Autologous blood injection into the articular cavity for the treatment of recurrent temporomandibular joint dislocation: a case report. *J Oral Sci* 2007;49(3):237-9.
10. Schulz S. Evaluation of periarticular autotransfusion for therapy of recurrent dislocations of the temporomandibular joint. *Dtsch Stomatol* 1973;23(2):94.
11. 11. Jacobi-Hermanns E, Tetsch P. Pericapsular autologous blood injection as therapy for habitual temporomandibular joint luxation. *Dtsch Zahnarztl Z*. 1981;36(3):187.
12. 10'Driscoll SW, Giori NJ. Continuous passive motion (CPM): theory and principles of clinical application. *J Rehabil Res Dev* 2000;37(2):179.
13. Roosendaal G, TeKoppele JM, Vianen ME, Van Den Berg HM, Lafeber FP, Bijlsma JW. Blood-induced joint damage: a canine in vivo study. *Arthritis Rheum* 1999;42(5):1033-9.
14. Hooiveld M, Roosendaal G, Wenting M, van den Berg M, Bijlsma J, Lafeber F. Short-term exposure of cartilage to blood results in chondrocyte apoptosis. *The American Journal of Pathology* 2003;162(3):943-51.
15. Miller GA, Murphy EJ. External pterygoid myotomy for recurrent mandibular dislocation: review of the literature and report of a case. *Oral Surg Oral Med Oral Pathol* 1976;42(6):705-16.
16. Nitzan DW. Temporomandibular joint "open lock" versus condylar dislocation: signs and symptoms, imaging, treatment, and pathogenesis. *J Oral Maxillofac Surg* 2002;60(5):506-11.
17. Jacobi-Hermanns E, Wagner G, Tetsch P. Investigations on recurrent condyle dislocation in patients with temporomandibular joint dysfunction: a therapeutic concept. *Int J Oral Surg* 1980;10(Suppl 1):318-23.
18. Candirli C, Yüce S, Cavus UY, Akin K, Cakir B. Autologous blood injection to the temporomandibular joint: magnetic resonance imaging findings. *Imaging Science in Dentistry* 2012;42(1):13-8.
19. Daif ET. Autologous blood injection as a new treatment modality for chronic recurrent temporomandibular joint dislocation. *Oral Surg*

- Oral Med Oral Pathol Oral Radiol Endod 2010;109(1):31-6.
20. Safran MR, Johnston-Jones K, Kabo JM, Meals RA. The effect of experimental hemarthrosis on joint stiffness and synovial histology in a rabbit model. *Clin Orthop Relat Res* 1994;303:280-8.
  21. Çandrl C, Yüce S, Yldrm S, Sert H. Histopathologic evaluation of autologous blood injection to the temporomandibular joint. *J Craniofac Surg* 2011;22(6):2202-4.
  22. Cooper A, Green JH, Castle T. *A manual of surgery*. 3rd ed. Boston: Munroe and Francis; 1832:355-8.
  23. Qiu W, Ha Q, Hu Q. Treatment of habitual dislocation of the temporomandibular joint with subsynovial injection of sclerosant through arthroscope. *Proceedings of the Chinese Academy of Medical Sciences and the Peking Union Medical College (Chung-kuo i hsueh k'o hsueh yuan, Chung-kuo hsieh ho i k'o ta hsueh hsueh pao)* 1988;4(4):196-9.
  24. Ziegler CM, Haag C, Mühling J. Treatment of recurrent temporomandibular joint dislocation with intramuscular botulinum toxin injection. *Clin Oral Investig* 2003;7(1):52-5.
  25. Schiffman E, Look J, Hodges J, Swift J, Decker K, Hathaway K. Randomized effectiveness study of four therapeutic strategies for TMJ closed lock. *J Dent Res* 2007;86(1):58-63.
  26. Babadağ M, Görgün S, Sahin M. Pre-and posttreatment analysis of clinical symptoms of patients with temporomandibular disorders. *Quintessence Int* 2004;35(10):811-4.