International Journal of Surgery

Journal Homepage: ijsopen.org

Research Article

Efficacy of Autologous Blood Injections in Treatment of Chronic Recurrent TMJ Dislocation Based on its Severity: A Prospective Study

Shikha Goyal[1*], Freny R. Karjodkar[2], Kaustubh Sansare[3] and Ankita Verma[4]

[1]Ex-Resident, Department of Oral Medicine and Radiology, Nair Hospital Dental College, Mumbai, Maharashtra, India
[2]Ex-Professor and HOD, Department of Oral Medicine and Radiology, Nair Hospital Dental College, Mumbai, Maharashtra, India
[3]Professor and HOD, Department of Oral Medicine and Radiology, Nair Hospital Dental College, Mumbai, Maharashtra, India.
[4]Ex-Resident, Department of Pedodontics and Preventive Dentistry, Maulana Azad Institute of Dental Sciences and Hospital, Delhi, India

ARTICLE INFO

Article history:
Received: 25 December, 2023
Accepted: 30 January, 2024
Published: 22 March, 2024

Keywords:
TMJ dislocation, TMJ lock, TMJ injection, TMJ pain, TMJ subluxation

ABSTRACT

Aim: To study the efficacy of autologous blood injections in treatment of chronic recurrent TMJ dislocation based on the severity of the condition. **Method and Material:** Total 26 patients with complain of chronic recurrent bilateral TMJ dislocation were included in the study. The patients were grouped into three groups based on the frequency of episodes of TMJ dislocation: Group 1 (7 patients) included patients with minimum one episode of TMJ dislocation each day, Group 2 (5 patients) included patients with minimum of 2 episodes of TMJ dislocation each week and Group 3 (14 patients) included patients with minimum of 2 episodes in last 6 months. In each joint, 2ml of autologous blood was injected in superior joint space and 0.5 ml was injected into the peri capsular area. Post injection patients were followed for the period ranging from 6 months to the 2 years. Patients were assessed for frequency of episodes of TMJ dislocation and inter-incisal opening (IO) before the start of the treatment and during the follow up visit. **Results:** On long term follow up (1 to 2 years) 2 patients in Group 1 showed recurrence of TMJ dislocation. However, none of the patients from Group 2 and 3 showed recurrence of the condition. It was analyzed that success of the ABI was found to be inversely proportional to the frequency of the episodes during the pre -injection phase. **Conclusion:** ABI is the safe, conservative, cost effective, non- invasive and simpler treatment approach for the TMJ dislocation, however the treatment outcome is better with the patients experiencing less frequent episodes.

1. Introduction

Temporomandibular joint dislocation is the temporomandibular joint (TMJ) disorder in which the condyles gets translated outside the glenoid fossa; ahead of articular eminence on wide mouth opening and does not go back into the position even by conscious efforts by the patients. The condition in which the patient needs the professional help to relocate the condyle back into the glenoid fossa is called as TMJ dislocation. The condition in which patients can relocate the condyle back into the glenoid fossa with some concious efforts without the need of professional help is classified as TMJ subluxation [1]. Several theories have been put forward regarding the etiology of the TMJ dislocation like laxity of the TMJ ligaments, weakness of the TMJ capsule, insufficient eminence size, muscle hyperactivity, muscle spasm, and abnormal chewing activities [2].

Various conservative [3-5] and surgical treatment modalities has been proposed in the literature for the treatment chronic recurrent TMJ dislocation. However, providing the patient with the simple, conservative intervention without compromising the anatomy and also promising long term results to the patient without complication like TMJ ankylosis has always been a challenge for the clinician.

Brachmann [6] in 1964; introduced intra-articular autologous blood injections (ABI) in the literature for the treatment of chronic recurrent TMJ dislocation and mentioned no complications. However, after long dry spell on this subject, studies have been conducted in the recent past to assess the efficacy of ABI by combining it with different techniques to assess and obtain the best treatment outcome for TMJ dislocation. In 2010, Daif [7] conducted the study and reported more success rate on injecting ABI into the superior joint space and peri-capsular area combined (12 out of total 15 patients) than injecting only in the superior joint space joint (9 out of total 15 patients). In 2013, Ayman [8] carried

Correspondence to: Dr. Shikha Goyal, Ex-Resident, Department of Oral Medicine and Radiology, Nair Hospital Dental College, Mumbai, 400008, Maharashtra, India; Tel: +919022764920; E-mail: dr.shikhagoyal15@gmail.com

DOI: 10.60122/j.IJS.2024.10.04

out the randomized control trial and recommended combining ABI with intermaxillary fixation to improve outcome. Severity and frequency of episodes of TMJ dislocation can range from multiple episodes each day to one episode in a year. None of the studies in the past assessed the efficacy of ABI in the treatment of TMJ dislocation based on its wide range of severity.

However, Cilal Candrili [9] in its study compared the efficacy of ABI in patients of TMJ dislocation with frequency of episodes of TMJ dislocation ranging within the short period of one week. In the present study we aimed to compare the efficacy of ABI in patients of TMJ dislocation based on the severity or frequency of TMJ dislocation i.e evaluating the efficacy of ABI in patients experiencing TMJ dislocation with frequency of episodes ranging between minimum 1 episode each day to minimum 2 episodes in last 6 months.

2. Method and Materials

2.1. Subjects

The ethical clearance for the study was obtained from the Institutional review board of Nair Hospital Dental College (reference number: EC-28/DOMR-13ND/2015); where the study was conducted. Patients with the complaint of bilateral chronic recurrent TMJ dislocation were selected for the study after the considering inclusion and exclusion criteria. Patients were explained about the injection technique in their known language and informed consent was obtained. Sample size consisted of 12 males and 14 females; total 26 patients within the age range of 14 to 47 years and each patient was followed for the period of minimum 6 months to maximum of 2 years.

Patients visiting the department with the complaint of bilateral chronic recurrent TMJ dislocation with the frequency of minimum 2 episodes in last 6 months were included in the study. The patients were grouped into three groups based on the frequency of episodes of TMJ dislocation: Group 1 (7 patients) included patients with minimum one episode of TMJ dislocation each day, Group 2 (5 patients) included patients with minimum of 2 episodes of TMJ dislocation each week and Group 3 (14 patients) included patients with minimum of 2 episodes in last 6 months. Patients diagnosed with any other TMJ disorders such as disc displacements, degenerative joint disorders based on diagnostic criteria (DC/TMD) 2015, patients with history of previous treatment; either conservative or surgical therapy for TMJ dislocation and patients with any other major medical illness like hypertension, diabetes, bleeding disorders, anemia, malignancy, and infectious diseases like tuberculosis were excluded from the study. All the patients selected for the study were made to undergo complete clinical and radiological TMJ examination based on DC/TMD criteria to rule out any other TMJ disorder. Laboratory investigations like bleeding time, clotting time and haemoglobin count was carried out for each patient before inclusion into the study.

2.2. Injection Technique

The intra-articular injections were given under all aseptic precautions. Pre auricular region was prepared using povidone iodine solution. Intra articular fossa was identified by palpating the borders of the condylar head and articular eminence. 0.5 ml of local anesthesia was injected intra-dermally into the pre auricular region. 5 ml of blood was withdrawn from the left brachial vein under all aseptic precautions. 24-gauge needle was inserted 0.5 mm ahead of tragus and 0.5 mm below the marked boundary of the roof of glenoid fossa. Needle was directed in upward, backward and medial direction to reach the superior joint space. On hitting the roof of glenoid fossa, needle was withdrawn a little and autologous blood was injected. 2 ml of blood was injected in each joint and 0.5 ml was injected in peri capsular region as the needle was withdrawn out. Postoperative follow up was done at the end of 1 week, 15 days and 1 month and 6 months, 1 years and 2 years. Maximum 2 injections were considered for each patient. Decision for the second injection was made on the basis of clinical response on the second follow up visit. If patient did not respond positively to the second injection or reported recurrence with the same frequency of episodes as pretreatment during the follow up phase, then the case was considered failure and no additional injections were considered. All the clinical procedures were carried out by one investigator for all the patients.

2.3. Post Injection Care

Patient were kept under supervision for 30 minutes to check for any postoperative complications like pain, infection, haematoma and trismus at the site of blood collection and injection. Postoperative antibiotics (cap amoxicillin (250 mg plus cloxacillin (250 mg) and analgesic (Tab ibuprofen 400mg) thrice a day was prescribed to the patient for 5 days to take care of the possible complications if any. Patients were advised soft diet and restricted mouth opening for 15 days.

All the patients were evaluated for the inter incisal opening (IO) with the help of vernier caliper and frequency of episodes of TMJ dislocation before the first injection and then regularly during the follow up visits.

2.4. Statistical Analysis

Data obtained was compiled on a MS Office Excel Sheet (v 2010) and was subject to statistical analysis using Statistical package for social sciences (SPSS v 21.0, IBM). Descriptive statistics like mean age, gender-wise distribution, no of episodes with various time intervals has been depicted. Comparison of Mean IO over various time intervals has been done using repeated measures ANOVA, followed by post hoc Tukeys test. For all the statistical tests, $p<0.05$ was considered to be statistically significant.

3. Results

Total 26 patients were included in the study with the mean age of 24. 92 years (SD ± 8.442), consisting of 12 males and 14 females. The pretreatment frequency of episodes of TMJ dislocation ranged from 15 episodes per day to 3 episodes in last 6 months. As seen in (Table 1); on coding the baseline severity it was found that in Group 1, out of 7 patients only 2 patients reported episodes of TMJ dislocation on first follow up visit, out of which 1 stating no improvement with episodes of TMJ dislocation post injection and experiencing minimum 10 episodes in a post-injection week. On long term follow up 2 patients from Group 1 reported recurrence of TMJ dislocation. In Group 2, out of 5 patients only 2 patients complained of episodes of dislocation on first follow up

visit with significant improvement in severity and number but none experienced recurrence on long term follow up. In Group 3, out of 14 patients no patient reported episodes of TMJ dislocation on first follow up visit and also on long term follow, none of the patients in Group 3 showed recurrence. It was inferred that the success of the ABI was inversely proportional to pre- treatment frequency of episodes of TMJ dislocation and is statistically significant ($p<0.05$). As seen in (Table 2); there was statistically significant difference in the mean inter incisal opening during pre-injection and post injection follow period i.e ($p<0.05$) using Friedman's test. On applying Wilcoxon signed Ranks test it was also confirmed that there is significant difference in the inter incisal opening during pre-injection and post injection follow up periods, however no significant difference was observed in the interincisal opening measured at different follow up period during post injection phase.

TABLE 1: Assessment of base line severity.

Time follow-ups	**No of Episodes**	**Coded as baseline severity**			**p value of chi square test**
		Group 1	**Group 2**	**Group 3**	
7D	0	5	3	14	0.023*
	1	0	2	0	
	10	1	0	0	
	2	1	0	0	
15 day	0	4	5	13	
	1	1	0	1	0.313
	15	1	0	0	
	2	1	0	0	
1 M	0	4	4	13	0.334
	1	1	1	1	
	4	1	0	0	
	10	1	0	0	
3 M	0	5	3	14	
	1	0	2	0	0.023*
	2	1	0	0	
	Recurrence	1	0	0	
6 M	0	3	1	11	
	1	1	1	3	
	2	1	1	0	0.111
	3	1	2	0	
	Recurrence	1	0	0	
Long term	No data	5	5	5	0.187
	0/ 1 years	0	0	2	
	0/ 2 years	0	0	4	
	1/ 2 years	0	0	1	
	2/ 1 year	0	0	1	
	3/2 years	0	0	1	
	RECURRENCE / 2 years	2	0	0	

TABLE 2: Comparison of IO over time intervals using Friedman's Test.

	N	Mean	Std. Deviation	Minimum	Maximum	Mean Rank
pre IO	26	45.17	9.157	23	63	5.88
IO 7D	26	38.65	9.988	21	60	3.31
IO 15D	26	38.56	9.498	21	60	2.85
IO 1M	26	39.08	9.217	19	60	3.02
IO 3M	26	38.77	9.201	20	60	2.81
IO 6M	26	39.04	9.293	22	63	3.13

Chi-Square: 67.166, df: 5, p = 0.000**.

4. Discussion

ABI has been used in the recent past to provide the patient with the conservative and long term solution of the TMJ disorder. Deposition of the autologous blood in the joint space and injection in the peri-capsular area initiates the inflammatory reaction into the joint space and adjoining area. Initially, there is formation of the organized blood clot and loose fibrous tissue. Eventually it undergoes scarring, fibrosis and adhesion, making the motion of the condyle difficult and preventing its translation outside the articular eminence [10, 11]. Concern has been raised time to time about it in terms of development of fibrous and bony ankylosis and degeneration of articular cartilage [12, 13]. In the present study we did not come across any such complication during the 2 years follow up visits. Few patients reported slight pain and swelling at the sight of injection, which resolved after 1 to 2 hours without any major intervention.

All the 26 patients were followed for 6 months regularly, out of which 25 patients (96%) reported marked improvement with symptoms of TMJ dislocation, 1 patient which belonged to the Group 1 before the start of treatment reported recurrence of the symptoms and no improvement with the frequency of episodes of TMJ dislocation. This particular patient was considered for second injection but showed no signs of improvement. Total 11 patients could be followed for the period of 2 years, out of which 9 patients reported marked improvement with symptoms of TMJ dislocation. 2 patients reported recurrence and were analyzed to belong to Group 1 before the start of treatment. No patient from Group 2 and Group 3 reported recurrence of symptoms. The average post injection maximal mouth opening was 38. 20 mm (SD= 11.163). Hence we could conclude that the success of the ABI varies with the severity of the disorders in the pre injection phase.

The groups in the present study were based on the number of times dislocation episodes occurred over a period of time. Group 1 included patients with minimum one episode of TMJ dislocation each day, Group 2 included patients with minimum of 2 episodes of TMJ dislocation each week and Group 3 included patients with minimum of 2 episodes in last 6 months. It was therefore plausible that the number of dislocation episodes were not distributed evenly across the groups. This heterogeneous distribution also infers that 2 episodes of dislocation every six months is more common than weekly or daily distribution of dislocations. The follow up period in the study was particularly 6 months because Group 3 which consisted of highest number of cases, represented minimum 2 episodes in six months. It was therefore imperative to follow up these cases for a minimum of 6 months. A shorter follow up period would have made it difficult to assess if there was a recurrence in Group 3.

In 2009, Machon *et al.* [2] included 24 patients in its study and reported success rate of 80 % after mean follow period of 1 year. Daif [7] in its study did not find any deleterious effect on TMJ on long term follow up and stated ABI as a safe and conservative technique for treatment of TMJ dislocation. In 2014, Bayoumi [14] injected ABI in 15 patients and reported marked improvement with symptoms in 12 patients with no untoward complications with average post injection maximal mouth opening as 34 mm. In 2001 Candral [15] in its study, studied the histopathological effects of autologous blood injection in rabbit TMJ, and found only fibrin deposition in the joint space with no evidence of fibrous bed formation or joint degeneration. In 2013, Stemberik [16] conducted the similar experiment with Pig TMJ and concluded that no structural changes or fibrous joint adhesions were seen with the joint post autologous blood injection either on MRI or histopathologically.

5. Conclusion

ABI is the simple, safe, conservative technique which should be attempted by the physician for the treatment of TMJ dislocation before suggesting invasive surgical procedures. Success of the treatment is based widely on the severity of the condition, Patients with less frequency of TMJ dislocation will have better outcome of the treatment than those with higher frequency of TMJ dislocation.

Limitations

i) Small sample size is the limitation of the present study, however given the rarity of the condition a larger study sample was not feasible. In future a multi-centric larger sample sized study could be performed.
ii) The mode of action of ABI could not be performed histologically in the present study, mainly because this being a human study it would be unethical to conduct histological examinations.
iii) In the present study, ABI was not tried and compared against a placebo controlled group, again a case control study could be performed in future studies.

Conflicts of Interest

None.

REFERENCES

[1] August M, Troulis MJ, Kaban LB: Hypomobility and Hypermobility Disorders of the Temporomandibular Joint. In:Miloro M,Ghali GE, Larsen PE, et al. eds. Peterson's Principles of Oral and Maxillofacial Surgery. London: BC Decker, pp. 1044-1048, 2004.

[2] Vladimir Machon, Shelly Abramowicz, Jan Paska, et al. "Autologous blood injection for the treatment of chronic recurrent temporomandibular joint dislocation." *J Oral Maxillofac Surg*, vol. 67, no. 1, pp. 114-119, 2009. View at: Publisher Site | PubMed

[3] Peter Aquilina, Richard Vickers, Geoffrey McKellar "Reduction of a chronic bilateral temporomandibular joint dislocation with intermaxillary fixation and botulinum toxin A." *Br J Oral Maxillofac Surg*, vol. 42, no. 3, pp. 272, 2004. View at: Publisher Site | PubMed

[4] Dolores Martínez-Pérez, Pedro García Ruiz-Espiga "Recurrent temporomandibularjoint dislocation treated with botulinum toxin: reportof 3 cases." *J Oral Maxillofac Surg*, vol. 62, no. 2, pp. 244-246, 2004. View at: Publisher Site | PubMed

[5] Kazuhiro Matsushita, Takae Abe, Toshikatsu Fujiwara "OK-432 (Picibanil) sclerotherapy for recurrent dislocation of the temporomandibular joint in elderly edentulous patients: Case reports." *Br J Oral Maxillofac Surg*, vol. 45, no. 6, pp. 511-513, 2007. View at: Publisher Site | PubMed

[6] F Brachmann "Autologous blood injection for recurrent hypermobilityof the temporomandibular joint." *Dtsch ZahnarztlZ*, vol. 15, pp. 97, 1964.

[7] Emad T Daif "Autologous blood injection as a new treatment modality for chronic recurrent temporomandibular joint dislocation." *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*, vol. 109, no. 1, pp. 31, 2010. View at: Publisher Site | PubMed

[8] Ayman F Hegab "Treatment of chronic recurrent dislocation of the temporomandibular joint with injection of autologous blood alone, intermaxillary fixation alone, or both together: a prospective, randomised, controlled clinical trial." *Br J Oral Maxillofac Surg*, vol. 51, no. 8, pp. 813, 2013. View at: Publisher Site | PubMed

[9] Celal Candirli, Yavuz Tolga Korkmaz, Serdar Yuce, et al. "The Effect of Chronic Temporomandibular Joint Dislocation: Frequency on the Success of Autologous Blood Injection." *J Maxillofac Oral Surg*, vol. 12, no. 4, pp. 414-417, 2013. View at: Publisher Site | PubMed

[10] E Jacobi-Hermanns, G Wagner, P Tetsch "Investigations on recurrent condyle dislocation in patients with temporomandibularjoint dysfunction: A therapeutical concept." *Int J Oral Surg*, vol. 10, no. Suppl 1, pp. 318-323, 1981. View at: PubMed

[11] S W O'Driscoll, N J Giori "Continuous pas-sive motion (CPM): theory and principles of clinical application." *J Rehabil Res Dev*, vol. 37, no. 2, pp. 179-188, 2000. View at: PubMed

[12] Michel Hooiveld, Goris Roosendaal, Marion Wenting, et al. "Short-term exposure of cartilage to blood results in chondrocyte apoptosis." *Am J Pathol*, vol. 162, no. 3, pp. 943-951, 2003. View at: Publisher Site | PubMed

[13] G Roosendaal, J M TeKoppele, M E Vianen, et al. "Blood-induced joint damage: a canine in vivo study." *Arthritis Rheum*, vol. 42, no. 5, pp. 1033-1039, 1999. View at: Publisher Site | PubMed

[14] A M Bayoumi, M O Al-Sebaei, K M Mohamed, et al. "Arthrocentesis followed by intra-articular autologous blood injection for the treatment of recurrent temporomandibular joint dislocation." *Int J Oral Maxillofac Surg*, vol. 43, no. 10, pp. 1224-1228, 2014. View at: Publisher Site | PubMed

[15] Celal Candrl, Serdar Yüce, Sibel Yldrm, et al. "Histopathologic evaluation of autologous blood injection to the temporomandibular joint." *J Craniofac Surg*, vol. 22, no. 6, pp. 2202-2204, 2011. View at: Publisher Site | PubMed

[16] J Stembirek, E Matalova, M Buchtova, et al. "Investigation of an autologous blood treatment strategy for temporomandibular joint hypermobility in a pig model." *Int J Oral Maxillofac Surg*, vol. 42, no. 3, pp. 369-375, 2013. View at: Publisher Site | PubMed