

## Comparison of mean decrease in mouth opening by autologous blood injection in superior joint space with and without pericapsular tissue in treatment of chronic recurrent temporomandibular joint dislocation in Mayo Hospital Lahore

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### Abstract

**Objectives:** Objectives: To compare the mean decrease in mouth opening by autologous blood injection in superior joint space with and without pericapsular tissue in the treatment of chronic recurrent temporomandibular joint dislocation.

**Methods:** The prospective study was conducted at the department of Oral and Maxillofacial Surgery, King Edward Medical University, Mayo Hospital, Lahore, Pakistan, from July, 2015, to January, 2016, and comprised patients, divided into two equal groups, having chronic temporomandibular joint dislocation. Group A patients were injected with autologous blood 2ml by 18-gauge single needle technique in superior joint space, while in group B patients, the needle was moved outward for 1cm and an additional 1ml of blood was injected in the pericapsular tissue under local anaesthesia in single setting after scrubbing local area with antiseptic solution. Data was analysed using SPSS 17.

**Results:** Of the 80 patients, there were 40(50%) in each of the two groups. In group A, there were 18(45%) males and 22(55%) females with an overall mean age of  $30.93 \pm 11.04$  years, and in group B there were 16(40%) males and 24(60%) females with an overall mean age of  $30.38 \pm 11.80$  years. In group A, the decrease in mouth opening in 34(85%) patients was 2-4 mm, and 6 (15%) had 5-7 mm. In group B, 14(35%) patients had 2-3 mm and 26(65%) patients had 5-7mm ( $p=0.001$ ).

**Conclusion:** The procedure was found to be safe, simple and cost-effective for the treatment of temporomandibular joint dislocation, and it caused no foreign body reaction.

**Keywords:** Temporomandibular joint, Dislocation, Autologous blood injection.

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### Introduction

Temporomandibular joint (TMJ) dislocation occurs as when the condyle travels anterior to the articular eminence and remains there. Chronic recurrent TMJ dislocation may occur as a result of everyday activities such as yawning or laughing, or during events that require mouth opening for a continuous amount of time such as during dental treatment.<sup>1</sup> The suggested pathogenesis of recurrent TMJ dislocation include slackness for TMJ ligaments, unusual eminence size/projection, weakness of TMJ capsule, muscle hyper activity/spasm, trauma and abnormal chewing movements. Recurrent dislocation may lead to disc, capsule or ligament injury, leading to TMJ internal derangement. People having Ehlers Danlos syndrome and Marfan syndrome are genetically predisposed to this condition.<sup>1</sup> Chronic recurrent TMJ dislocation is distressing as it is painful and interferes with daily activities. This condition may badly affect an individual's daily life activity.<sup>1</sup>

Dislocation may be anterior, posterior, superior, medial or lateral to glenoid fossa, but the most common is anterior

dislocation.<sup>2</sup> Anterior dislocation of the head of condyle affects 3-7% of general population, especially females.<sup>3</sup>

Diagnosis is based on clinical and radiographic criteria.<sup>4</sup> Signs and symptoms include painful condition, elongated face, unable to close mouth, speech not clear, and no visible sign of contusion or surgical scar.<sup>3</sup> TMJ dislocation may cause sleep deprivation, tiredness/lethargy, frustration, burst of anger, depression and hearing sensitivity.<sup>5</sup> Clinical examination reveals palpable bilateral pre-auricular depression due to condylar head being out of empty fossa. Masticatory muscles are usually not tender.

Orthopantomogram (OPG) shows both right and left condylar heads being positioned anterior to glenoid fossa.<sup>2</sup>

For treatment of chronic recurrent TMJ dislocation, different surgical and non-surgical techniques have been described in literature.<sup>1</sup> Non-surgical or conservative methods include restriction of mandibular movements, application of local anaesthetics, injection of Botulinum Toxin to the muscle of mastication, sclerosing agents and autologous blood injection (ABI). Multiple surgical techniques have been tried like capsular placcation, reduction or augmentation of articular eminence, temporalis tendon scarification, lateral pterygoid myotomy

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and condylectomy.<sup>4</sup>

The first reported ABI into TMJ as a treatment for recurrent dislocation was by in 1964 when 60 patients were treated, but recently the technique has been reintroduced.<sup>1</sup> In one of the comparative studies in which two groups were selected, group A was treated with ABI only in superior joint space (SJS) and group B was treated by ABI in both SJS and pericapsular tissue (PT) and showed 80% success rate in terms of mean decrease in mouth opening in group B compared to 60% in group A.<sup>4</sup>

ABI to TMJ follows the pathophysiology of bleeding in joints. The joint becomes physically more difficult to move. Next, a combination of an organised blood clot and loose fibrous tissue maintains joint stiffness. The tissues become mature and cause permanent limitation of movement of the joint. Additionally, exposure of blood to cartilage causes localised contraction.<sup>2</sup> ABI limits mandibular movements.<sup>6-8</sup>

ABI to TMJ in patients with chronic recurrent dislocation is easy to perform than other traditional procedures. There have been very few studies reporting decrease in mouth opening by ABI in SJS with and without PT. The current study was planned to compare the mean decrease in mouth opening by ABI in SJS with and without PT in the treatment of chronic recurrent TMJ dislocation.

## Patients and Methods

The prospective study was conducted at the Department of Oral and Maxillofacial Surgery, King Edward Medical University (KEMU), Mayo Hospital, Lahore, Pakistan, from July, 2015, to January, 2016, and comprised patients, divided into two equal groups, having chronic TMJ dislocation. After approval from the institutional ethics review board, the sample size was calculated at 80% power of test and while taking the expected mean decrease in mouth opening to be  $3.6 \pm 1.5$  mm in group A and  $5.3 \pm 1.2$  mm in group B in treatment of chronic recurrent TMJ dislocation.<sup>4</sup>

The sample was raised using non-probability consecutive sampling technique. Patients aged 15-60 years having either unilateral or bilateral chronic recurrent TMJ dislocation with several episodes of dislocation were included. Patients with acute dislocation, meaning the first episode of dislocation, those with inflammatory diseases of TMJ, such as rheumatoid arthritis and tuberculous arthritis, evidence of tumour or tumour-like lesion in the TMJ and those suffering from systemic diseases, like platelet function disorders and fibrinogen deficiency, were excluded. After taking informed consent from all the subjects, demographic details and clinical and radiographic

findings through cone beam computed tomography (CBCT) were noted. Preoperatively, mouth opening was measured. Further, 3ml blood was collected into a syringe from the patients' antecubital fossa. The patients were bilaterally injected autologous blood 2ml by 18-gauge single needle technique in SJS in group A, while in group B, after performing aspiration, the needle was moved outward for 1cm and an additional 1ml of blood was injected in PT under local anaesthesia in a single setting after scrubbing the local area with antiseptic solution.

After completion of the injection procedure, an elastic head bandage was applied for 24 hours and patients were instructed to take only soft diet for 1 week. Antibiotic amoxicillin/clavulanate potassium 1 gm tablets (each tablet contains 875 mg amoxicillin potassium and 125 clavulanate, was given twice daily for 5 days. Analgesic tablets 50 mg Diclofenac potassium was given 3 times daily for 3 days. Mandibular exercises were advised 4 times daily after the first week. We had one follow up at after 3-months for all the patients. The patients were recalled at this follow up to observe and record clinical effects like decrease in mouth opening. A caliper was used and the patients were asked to open their mouth as wide as possible, then the vertical distance between the incisal edges of upper and lower incisors was measured. Mean decrease in mouth opening was measured. Radiographic findings were analysed and results were compared between the groups.

Data was analysed using SPSS 17. Quantitative variables, like mouth opening pre- and post-injection and age, were expressed as mean  $\pm$  standard deviation (SD). Qualitative variables, like gender and body mass index (BMI) were expressed as frequencies and percentages. Data was stratified for age, gender and baseline mouth opening to address the effect modifiers. Post-stratification t-test was applied for significance. Mean decrease in mouth opening was compared between the groups using independent sample t-test.  $P \leq 0.05$  was considered significant.

## Results

Of the 80 patients, there were 40(50%) in each of the two groups. In group A, there were 18(45%) males and 22(55%) females with an overall mean age of  $30.93 \pm 11.04$  years, and in group B there were 16(40%) males and 24(60%) females with an overall mean age of  $30.38 \pm 11.80$  years.

In group A, there were 31(77.5%) patients aged 15-37 years and 9(22.5%) aged 38-60 years. In group B, there were 30(75%) patients aged 15-37 years and 10(25%) aged 38-60 years. In group A, 23(57.5%) patients had BMI  $< 30$  kg/m<sup>2</sup> and 17(42.5%) had  $\geq 30$  kg/m<sup>2</sup>. In group B, 25(52.5%) patients had BMI  $< 30$  kg/m<sup>2</sup> and 15(37.5%) had  $\geq 30$  kg/m<sup>2</sup>. Besides, 15(37.5%) patients in group A had 45-47mm and

**Table-1:** Frequency and percentage of mouth opening pre-injection in both groups (n = 80).

Mouth opening pre-injection (mm)	Group A (n = 40) n (%)	Group B (n = 40) n (%)
45 – 47	15 (37.5)	12 (30)
48 – 50	25 (62.5)	28 (70)
Mean±SD	47.78±1.26	47.91±1.02

SD: Standard deviation

**Table-2:** Frequency and percentage of mouth opening post-injection in both groups (n = 80).

Mouth opening post-injection (mm)	Group A (n = 40) n (%)	Group B (n = 40) n (%)
41 – 43	12 (30)	22 (55)
44 – 47	28 (70)	18 (45)
Mean±SD	44.25±1.47	43.10±1.23

SD: Standard deviation

**Table-3:** Frequency and percentage of decrease in mouth opening in both groups (n = 80).

Decrease in mouth opening (mm)	Group A (n = 40) n (%)	Group B (n = 40) n (%)
2 – 4	34 (85)	14 (35)
5 – 7	6 (15)	26 (65)
Mean±SD	3.51±0.86	4.86±0.89
p- value	<0.0001	

SD: Standard deviation

**Table-4:** Stratification of decrease in mouth opening according to genders in both groups (n=80).

Gender	Group A (n = 40) Mean±SD	Group B (n = 40) Mean±SD	p- value
Male	3.61±0.98	4.78±0.80	<0.0001
Female	3.43±0.76	4.92±0.96	<0.0001

SD: Standard deviation

**Table-5:** Stratification of decrease in mouth opening according to age in both groups (n = 80).

Age (years)	Group A (n = 40) Mean±SD	Group B (n = 40) Mean±SD	p- value
15 – 37	3.40±0.82	4.83±0.90	<0.0001
38 – 60	3.89±0.93	4.95±0.90	<0.0001

SD: Standard deviation

**Table-6:** Stratification of decrease in mouth opening according to baseline mouth opening in both groups (n = 80).

Baseline mouth opening (mm)	Group A (n = 40) Mean±SD	Group B (n = 40) Mean±SD	p- value
45 – 47	3.63±0.88	4.96±1.01	<0.0001
48 – 50	3.44±0.86	4.82±0.85	<0.0001

SD: Standard deviation

25(62.5%) had 48-50mm pre-injection mouth opening. The corresponding numbers in group B were 12(30%) and 28(70%). The mean pre-injection mouth opening was 47.78±1.26 mm in group A and 47.91±1.02mm in group B

**Table-7:** Recurrence rate at final follow-up.

Recurrence	Group A (n = 40) Mean±SD	Group B (n = 40) Mean±SD	p- value
Yes	3	2	N/S
No	37	38	

SD: Standard deviation

(Table 1).

Post-injection mouth opening was 41-43 mm in 12(30%) patients in group A and 22(55%) in group B, while it was 44-47mm in 28(70%) patients in group A and 18(45%) in group B. Mean post-injection mouth opening was 44.25±1.47mm in group A and 43.10±1.23mm in group B (Table 2).

Further, 34(85%) patients had 2-4mm and 6(15%) had 5-7mm decrease in mouth opening in group A, while in group B, 14(35%) had 2-3mm and 26(65%) had 5-7mm decrease (p<0.0001) (Table 3). Recurrence of dislocation was found overall in 5(6.25%) patients; 3(60%) in group A and 2(40%) in group B (p>0.05).

Stratification for decrease in mouth opening with regards to gender, age and baseline values were noted (Tables 4-6).

### Discussion

Mouth opening is a commonly used term in daily professional practice. It is the denominator for a number of pathological entities. Patients with TMJ diseases, craniofacial syndromes, maxillofacial trauma, oral malignancies and those who have been treated for these conditions often complain of restricted mouth opening. As with any other disease or condition, the treatment of disorders affecting mouth opening is to restore the mouth opening to its normal value.<sup>8</sup>

Chronic recurrent TMJ dislocation is a painful and alarming illness in which the patients usually cannot reduce dislocated joints by themselves and need a doctor for the treatment. Non-surgical methods, such as occlusal rehabilitation, controlled exercise, physiotherapy with ultra-shortwave, and medication are usually first applied to the patients before opting for surgery. There are some successful non-surgical treatment models described in literature, such as injection of a sclerosing solution into the joint cavity. However, many side effects and the possible risk of facial paralysis or traumatic arthritis have hindered its widespread usage.<sup>1-6</sup>

Another procedure with fewer side effects is the use of botox.<sup>9</sup> The toxin temporarily causes denervation of the muscles that draw the chin down. The muscle of choice for injection is the lateral pterygoid muscle. In this way, the

displacement of the condyle is prevented even when the mouth is opened excessively.<sup>10,11</sup>

Over the last three decades, ABI has been used as the treatment of choice for chronic recurrent TMJ dislocation. It is thought that ABI is more advantageous because of the less complication with procedural ease. A study<sup>12</sup> reported different types of TMJ dislocations and discussed the structural factors predisposing patients to dislocation, and concluded that conservative approaches should be utilised before adopting the more invasive and complex surgical procedure.

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 than in group B, i.e. the success of ABI decreased with an increased dislocation frequency 2 to 3 times per day. The findings were consistent with global literature.<sup>1,4</sup>

Many studies have reported that ABI of TMJ is a simple, safe and cost-effective technique for treating chronic TMJ dislocation.<sup>4,13</sup>

Compared to other nonsurgical and surgical techniques, ABI has the advantages of being repeatable, not requiring tissue dissection, and having fewer post-operative complications.<sup>4</sup>

The uncertain nature of the pathophysiology of the procedure is the main disadvantage of ABI.<sup>14,15</sup> 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.

In the current study, there was significant decrease in mouth opening in both groups at final follow-up, and these findings are consistent with earlier results.<sup>13</sup>

In the present study, significant reduction in mouth opening occurred, and among those in whom it was not the case, the difference may have been due to not following the prescribed soft diet and life pattern, such as nature of job, routine speaking and daily exercise etc., of patients in whom reduction in mouth opening did not occur without physiotherapy.<sup>16</sup>

A study<sup>1</sup> reported that 20 among 25 patients were treated successfully with 1 or 2 injections (2cc in SJS and 1cc in PT). Based on their number of patients, there was no benefit after 2 ABIs to the TMJ, and surgical intervention was pursued.<sup>1</sup>

In one study,<sup>4</sup> 30 patients having chronic recurrent TMJ

dislocation were randomly divided into 2 equal groups. Group A was treated only by 2cc ABI into SJS, whereas group B received 2cc ABI to SJS and 1cc in PT. At the end of the follow-up period of 1 year, the results showed that ABI to SJS and PT gave a higher success rate (80%) than its injection only into the SJS (60%). Results of both groups compared and both groups revealed successful results.<sup>4</sup> The results of this study are also consistent with those of the present study.

The relatively simple procedure, the very low amount of blood involved, the restriction of movement after the procedure, and the prevention of weight-bearing on the mandible might be the possible reasons for the occurrence of no complications. Some studies applied controlled-exercise programmes for patients to potentially limit mandibular movement after the procedure.<sup>1</sup>

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.

## Conclusion

ABI to treat TMJ in patients with chronic recurrent dislocation was found to be a simple, safe and cost-effective technique. There is need to feel encouraged to go for ABI to SJS and PT for the treatment of patients with chronic recurrent TMJ dislocation.

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**Conflict of Interest:** None.

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