

# Autologous Blood Injection for the Treatment of Chronic Recurrent Temporomandibular Joint Dislocation

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**Purpose:** Many different surgical techniques for the treatment of chronic recurrent temporomandibular joint (TMJ) dislocation have been described. This article discusses a technique of autologous blood injection to the TMJ for treatment of chronic recurrent TMJ dislocation.

**Materials and Methods:** Twenty-five patients diagnosed with chronic recurrent TMJ dislocation were treated by bilateral injections of autologous blood into the upper joint space and around the TMJ capsules bilaterally.

**Results:** Eighty percent had a successful outcome and required no further treatment at their 1-year follow-up.

**Conclusion:** This procedure has proven to be safe, simple, and cost effective for the treatment of chronic recurrent TMJ dislocation.

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Temporomandibular joint (TMJ) dislocation occurs 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. Chronic recurrent TMJ dislocation is distressing because it is painful and because it interferes with daily activities. As a

result, this condition may adversely affect an individual's life.<sup>1</sup>

The pathogenesis of chronic recurrent TMJ dislocation is attributed to a combination of factors including laxity of the TMJ ligaments, weakness of the TMJ capsule, an unusual eminence size or projection, muscle hyperactivity or spasms, trauma, and abnormal chewing movements that do not allow the condyle to translate back.<sup>2,3</sup> Recurrent dislocation of the TMJ may cause injury to the disc, the capsule, and the ligaments, leading to progressive TMJ internal derangement.<sup>3,4</sup> To treat this condition, nonsurgical interventions have been pursued, including restriction of mandibular range of motion combined with muscle relaxants and a soft diet,<sup>5</sup> application of local anesthetics,<sup>2</sup> injection of botulinum toxin to various muscles of mastication,<sup>6-9</sup> and injection of sclerosing agents.<sup>10,11</sup> Conservative treatment methods are not always successful; therefore, multiple surgical interventions were developed including eminectomy,<sup>12</sup> capsular plication,<sup>13</sup> temporalis tendon scarification,<sup>14</sup> and lateral pterygoid myotomy.<sup>15,16</sup> In addition, there are general anesthetic risks as well as surgical risks associated with these procedures.

Autologous blood injection to the TMJ as a treatment of chronic recurrent TMJ dislocation was first reported by Brachmann, in 1964.<sup>17</sup> Several articles followed,<sup>14,18-20</sup> but for unclear reasons, autologous

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blood injection to the TMJ never gained popularity. This technique was recently reintroduced.<sup>21,22</sup> The purpose of this article is to report our experience with autologous blood injections as a treatment for chronic recurrent TMJ dislocation.

## Materials and Methods

Twenty-five of the patients who presented to the Department of Oral and Maxillofacial Surgery, Faculty Hospital (Prague, Czech Republic) were consecutively diagnosed with chronic recurrent TMJ dislocation. They were therefore included in this prospective study. They consisted of 6 males and 19 females, with an average age of 32.7 years old (range, 17-58 years). Their clinical examination consisted of bilateral TMJ palpation and measurement of the distance between maxillary and mandibular incisal edges (MIO). Their average MIO was 37 mm (range, 32-45 mm). Average duration of symptoms was 11 months (range, 3 months to 4 years). Average number of episodes of dislocation was once a day (range, every mouth opening to once a week). Nine of the patients were able to self-reduce the dislocation, whereas others required assistance. Radiographic panoramic imaging showed both condyles to be anterior to the articular eminence. The patients were diagnosed with chronic recurrent TMJ dislocation based on previously published clinical and radiographic criteria.<sup>3</sup>

Instead of open surgical intervention, all patients underwent bilateral autologous blood injections to their temporomandibular joints. This was completed by the same surgeon, in the same clinic, and followed the same protocol. First, local anesthesia was administered to the auriculotemporal nerve. Previously established steps for arthrocentesis<sup>23</sup> were then followed by locating the articular fossa at a point 10 mm anterior to the tragus and 2 mm inferior to the tragal canthal line. In this location, an 18-gauge needle was inserted into the upper joint space (UJS) of the TMJ and correct placement was confirmed by movement of the mandible when fluid was gently injected. A second needle was placed in the UJS to verify placement into the UJS and allow for fluid to exit during the lavage. The joint was then flushed with approximately 5 mL of lactated Ringers solution. Three milliliters of blood were then withdrawn from the patient's anticubital fossa. Two milliliters were injected into the UJS and 1 mL was injected around the capsule. The second needle was withdrawn prior to the blood injection into the joint. This procedure was then repeated on the opposite side in the same manner. An occlusive head bandage was then applied.

After the procedure, the patients received specific instructions to guide their postoperative rehabilitation and establish a controlled mouth opening. Dur-

ing the first 2 weeks, the patients wore a head dressing at all times, restricted mouth opening to 20 mm, and followed a diet limited to soft foods only. Starting at 2 weeks, the patients began jaw rehabilitation via gradual and controlled range of motion exercises in front of a mirror. They wore the head dressing only while sleeping, and advanced their diet as tolerated. The patients returned for follow-up after 1 week, 2 weeks, 4 weeks, 3 months, 6 months, and 1 year. The patients reported the number of dislocation episodes and the duration of symptoms. The clinical exam consisted of MIO measurement and evaluation of TMJ hypermobility by palpating the condylar head during mouth opening and closing.

## Results

One week after the first autologous blood injection, 16 patients (64%) denied TMJ dislocation and 9 patients (36%) continued to dislocate. A tenth patient reported dislocation 4 weeks after the initial injection. These patients received a second injection to their TMJ at their 1 week follow-up and the tenth patient was reinjected at the 4-week follow-up. Of these 10 patients, 3 reported dislocation at their 1-week follow-up and 2 dislocated at their 4-week follow-up. Therefore, of the 25 patients initially treated, 20 patients were successfully treated with 1 or 2 injections (80%) at the 1-month follow-up. The remaining 5 patients were treated for the third and last time with bilateral autologous blood injections but continued to dislocate and chose to proceed with open TMJ surgery (Fig 1). Combining all patients who received 1, 2, or 3 injections, 20 patients (80%) denied recurrent episodes of TMJ dislocation at their 6-month and 12-month follow-up appointments. Only 5 patients (20%) required open TMJ surgery (Fig 1).

The average postoperative maximal mouth opening was 35 mm (range, 31-41 mm). There were no complications in the postoperative period. No cases of facial nerve weakness or numbness developed, and there were no scars, no deviations on mouth opening, and no other untoward sequelae. The average postoperative follow-up period was 12 months (range, 12-24 months). The longest follow-up consists of 24 months, with no dislocation.

## Discussion

TMJ dislocation occurs because of multiple factors that prevent the condyle from translating back to the condylar fossa, thus leading to chronic recurrent condylar dislocation. These include laxity of the TMJ ligaments, a large or abnormally placed eminence size or projection, and muscle hyperactivity or spasms.<sup>21</sup> This condition is prevalent in patients with TMJ inter-

Patient	Dislocation after first injection	Number wks after first injection until re-dislocation	Dislocation after second injection	Number wks after second injection until re-dislocation	Dislocation after third injection	Outcome
1	N					
2	N					
3	N					
4	Y	1 week	N			
5	N					
6	Y	1 week	N			
7	N					
8	N					
9	Y	1 week	N			
10	N					
11	N					
12	N					
13	Y	1 week	N			
14	N					
15	N					
16	N					
17	N					
18	N					
19	Y	4 weeks	N			
20	N					
21	Y	1 week	Y	4 weeks	Y	Open
22	Y	1 week	Y	1 week	Y	Open
23	Y	1 week	Y	1 week	Y	Open
24	Y	1 week	Y	4 weeks	Y	Open
25	Y	1 week	Y	1 week	Y	Open

**FIGURE 1.** Results of autologous blood injection to the TMJ for treatment of chronic recurrent TMJ dislocation.

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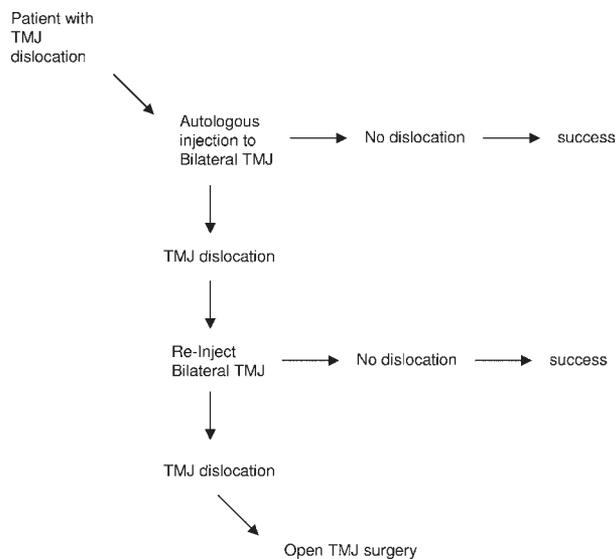
nal derangement, joint laxity, occlusal disturbances, loss of vertical height, neurological disorders, or as a result of trauma.<sup>3</sup>

There are several noninterventional methods used to treat patients with chronic recurrent TMJ dislocation such as physiotherapy, occlusal splints, and avoiding activities such as biting into a large sandwich or yawning that cause a large mouth opening.<sup>24,25</sup> Minimally invasive methods include injections of sclerosing agents intra-articularly<sup>10</sup> or extracapsularly,<sup>20</sup> and injections of botulinum toxin to the surrounding muscles.<sup>6,7</sup>

Surgical options for the treatment of chronic recurrent TMJ dislocation are divided into 3 main categories: restriction of joint movement, augmentation of eminence, or removal of barriers to allow for a smooth path of translation. Techniques designed to restrict joint movement include capsular plication,<sup>13</sup> lateral pterygoid myotomy,<sup>16</sup> or scarification of the temporalis muscle.<sup>14</sup> Interventions that augment the eminence to create a barrier to the sliding path of the condyle can use alloplastic augmentation such as titanium miniplates,<sup>26,27</sup> sialastic implants,<sup>28</sup> Vitallium mesh or steel screws,<sup>29-31</sup> metal eminence prostheses,<sup>32,33</sup> or blocks of hydroxyapatite.<sup>34</sup> Autogenous augmentation uses bone grafts obtained from the down fracturing of the zygomatic arch,<sup>35-37</sup> the calvarium,<sup>4</sup> or from the iliac crest.<sup>38</sup> The eminectomy<sup>12</sup> and the condylectomy<sup>39</sup> allow unrestricted sliding of the condyle by removing the anatomical barrier to the spontaneous reduction of the joint. Combinations of multiple methods have also been reported.<sup>38</sup>

Autologous blood injections to the TMJ as treatment for chronic TMJ dislocation was first reported in the German literature in 1964 by Brachmann. He successfully treated 60 patients by autologous blood injections to their temporomandibular joints.<sup>17</sup> Schulz treated 16 patients in 1973 by injection of autologous blood to the affected TMJ twice a week for 3 weeks followed by immobilization via intermaxillary fixation for 4 weeks. He reported that at a 1-year follow-up, 10 patients were symptom free.<sup>20</sup> In 1981, Jacobbi-Hermanns published her experience with 19 patients who received only 1 autologous blood injection and had intermaxillary fixation for 14 days. At 18 months follow-up, 17 patients were symptom free.<sup>19</sup> Most recently, Hasson<sup>21</sup> reported his experience by successfully treating 3 patients, and Kato et al<sup>22</sup> successfully treated 1 of their patients. Our experience is consistent with previously reported publications; in our study of 25 patients, 20 patients were treated successfully with 1 or 2 injections. Based on our number of patients, there is no benefit after 2 injections of blood to the TMJ, and surgical intervention should be pursued at that time (Fig 2).

Blood injections to the TMJ follow the pathophysiology of bleeding in joints elsewhere in the body such as the knee or the elbow.<sup>40</sup> Initially, the joint capsule and the periarticular tissues are distended by blood that is introduced. During the next few hours or days, an inflammatory reaction takes place<sup>41</sup> and inflammatory mediators released by platelets and the dead and injured cells cause adjacent blood vessels to dilate and leak plasma, which results in swelling of



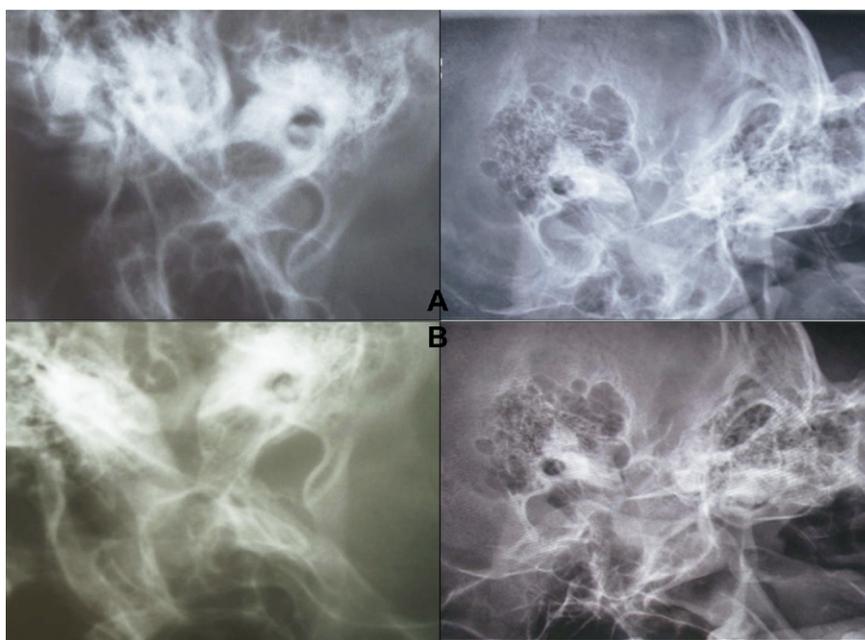
**FIGURE 2.** Treatment sequence of chronic TMJ dislocation via autologous blood injections.

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the adjacent tissues. This diminishes their compliance, and the joint becomes physically more difficult to move. Next, a combination of an organized blood clot and loose fibrous tissue forms, which maintains the joint stiffness. Last, this tissue matures and causes a permanent limitation of movement of the joint.<sup>40</sup> In addition, this exposure of cartilage to blood results in disturbance of cartilage matrix turnover<sup>42</sup> and in a

decrease of chondrocyte metabolism causing localized contraction.<sup>41</sup> Although after a trauma to the TMJ, range of motion exercises are done to avoid the concentration of inflammatory mediators in the joint, in the case of this deliberate hemarthrosis, the intent is the exact opposite. The injected blood would create an inflammatory reaction in the artificially created wound, which induces fibrosis, formation of adhesions, and scarring in the joint and in the surrounding soft tissue<sup>4,19</sup> with immobilization of the mandible avoiding early stretching of the newly formed fibrous tissue.<sup>19</sup> Challengers of this theory believe that even a brief exposure of cartilage to intra-articular blood may lead to permanent joint destruction,<sup>43</sup> such as degenerative joint damage,<sup>44</sup> chondrocyte apoptosis,<sup>42</sup> and cartilage degeneration, which may ultimately lead to joint destruction.<sup>44</sup> However, this amount of blood is similar to the amount present after an open TMJ procedure, and thus any subsequent joint damage is comparable. Radiographic imaging at the 1 year follow-up shows the lack of radiographic changes (Fig 3).

The procedure was successful in 80% of the patients. At the 1 year follow-up, these patients had no TMJ dislocations or subluxations, and had a functional range of motion with MIO of 35 mm. Because the technique could potentially severely restrict mandibular range of motion, it is important that patients undergo a controlled physical therapy program to reestablish a functional range of motion.<sup>45</sup> This procedure was unsuccessful in 5 cases (20%). In these



**FIGURE 3.** Radiographic imaging demonstrating lack of destructive changes to the condylar head (A, prior to intervention, B, at 1-year follow-up).

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patients bilateral eminectomies were completed successfully.

There are numerous advantages for the method of autologous blood injections for the treatment of chronic recurrent TMJ dislocation. Because there is no tissue dissection, postoperative complications such as facial nerve injuries, altered sensation, swelling, infection, and pain are all decreased or nonexistent. This procedure does not require admission to the hospital or general anesthesia because it can be performed under intravenous sedation or local anesthesia in an office setting.

In conclusion, the technique of intra-articular blood injection to the TMJ is a simple, safe, and cost-effective method that proved to be successful in 80% of patients with recurrent dislocation. Prior to performing an invasive surgical intervention, the oral and maxillofacial surgeon is encouraged to attempt this method when a patient presents with chronic recurrent TMJ dislocation.

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