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Autologous Blood Transfusion for Chronic Recurrent TMJ Dislocation:A Literature Review

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ABSTRACT

Temporomandibular joint dislocation occurs when the condyle moves beyond the anterior surface of the articular eminence, stays locked, and is unable to reduce itself back to the original position in the glenoid fossa. Dislocation of TMJ represents 3% of all reported dislocated joints in the body. It is a condition that may occur in an acute or chronic form and is characterized by inability to close the mouth with or without pain. The technique of intra-articular blood injection to the TMJ is a simple, safe, minimally invasive and cost-effective method that has proved to be successful in 80% of patients with recurrent dislocation. In this brief review of literature we aim to investigate the potency and safety of intra-articular injection of autologous blood in the management of chronic recurrent TMJ dislocation and discuss the history, mechanism of action, advantages and disadvantages of this technique.

Keywords: Temporomandibular joint dislocation, Autologous blood transfusion, Intra articular blood injection; tmj dislocation

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INTRODUCTION

The hypermobility disorder of the temporomandibular joint (TMJ) may be classified into hyper translation, subluxation, and dislocation [1]. Hyper translation is an excessive forward movement of the condylar head at mouth opening. Subluxation (habitual luxation) is the excessive excursion of the condyle secondary to laxity of the joint capsule [2,3]. The temporomandibular joint (TMJ) becomes dislocated when the condyle moves far anteriorly during opening and passes the articular eminence. Subsequently, the ligaments around the joint are often stretched by an intra-articular effusion, which causes severe discomfort and difficulty with speech and chewing because of muscular spasms and joint pain [4,5].

This condition can occur unilaterally or bilaterally with both requiring treatment immediately. It is believed that condylar dislocation may occur as a combination of 3 factors: laxity of mandibular and capsular ligaments, large bony eminence, and muscle spasm. The laxity of mandibular and temporomandibular joint (TMJ) capsule ligaments will permit the condyle to go far anterior during mandibular opening, trespassing the articular eminence [6].

Temporomandibular joint (TMJ) dislocation is a common situation often seen in emergency units. Acute dislocation of the TMJ is usually managed by manually pushing the mandible downward and backward to relocate the condyles in the glenoid fossa [7]. When dislocation becomes frequent, the condition is referred to as chronic recurrent dislocation [8]. Recurrent dislocation is characterised by a condyle that slides over the articular eminence, catches briefly beyond the eminence, and then returns to the fossa [3]. It may cause injury to the disc, the capsule, and the ligaments, leading to progressive TMJ internal derangement [9]. Chronic recurrent TMJ dislocation may occur as a result of everyday activities such as yawning and laughing or during events that require mouth opening for a continuous amount of time such as during dental

treatment [10]. The highest incidence of this problem is reported among females [11].

Various reviews of the literature show that several surgical and nonsurgical (conservative) techniques have been advocated for treating patients with chronic recurrent temporomandibular joint dislocation. [6,7,10,12] The nonsurgical interventions include restriction of mandibular range of motion combined with muscle relaxants and a soft diet [13], application of local anesthetics [3], injection of botulinum toxin to various muscles of mastication [14–16], and injection of sclerosing agents [17]. As conservative treatment methods are not always successful, multiple surgical interventions including eminectomy [18], capsular plication [19], temporalis tendon scarificationand lateral pterygoid myotomy [20], were developed. However, surgical risks as well as general anesthetic risks were associated with these surgical procedures [12]. Autologous blood injection to the TMJ as a treatment of chronic recurrent TMJ dislocation was first reported by Brachmann. It is a simple technique that can be performed on an outpatient basis[6]. In the past, some clinicians [21] have successfully treated cases of chronic recurrent TMJ dislocation with autologous blood injection into the TMJ; however, for reasons which were unclear this technique did not gain much popularity. The technique has recently been reintroduced by Machon et al. [12] and others [6,22]. With a rich case bank established over 3 decades we have been able to publish extensively in our domain [23–33]. Based on this inspiration, in this brief review of literature toinvestigatethe potency and safety of intra-articular injection of autologous blood in the management of chronic recurrent TMJ dislocation and discuss the history, mechanism of action, advantages and disadvantages of this technique.

History of autologous blood transfusion in the treatment of chronic recurrent TMJ dislocation

It was first used by Brachmann in 1964, who successfully treated 60 patients suffering from recurrent TMJ dislocation. In 1973, Schultz et al. [21] reported the injection of autologous blood for treatment of 16 patients suffering from recurrent dislocation of the TMJ. The patients were treated by injection of autologous blood to the affected TMJ two times a week for 3 weeks followed by intermaxillary fixation for 4 weeks. Out of these 16 patients, ten patients were asymptomatic after 1 year of follow-up, seven patients after 2 years of follow-up, and five patients after 5 years of follow-up. In 1981, Jacobi et al. [34] reported their experience with treatment of 19 patients. He injected autologous blood at only one time followed by intermaxillary fixation for 2 weeks. Out of 19 cases, 17 cases were asymptomatic with a decrease in maximal mouth opening when reviewed eighteen months postoperatively.

Recent literature regarding use of autologous blood transfusion in the treatment of chronic recurrent tmj dislocation

Inspite of documented successful reports regarding the use of autologous blood transfusion in the treatment of chronic recurrent dislocation, this treatment modality was not used for several years because of reasons which were unclear. In a study by Hasson et al [6] 3 patients (5 joints) who suffered from recurrent condyle dislocation were treated by this method. After injection of saline in the superior compartment, 5 cc of autologous blood which was drawn from the cubital fossa was injected. Following this an elastic bandage was applied and left for the first 24 hours. At follow-up all patients presented with normal mouth opening and dislocation of condyles did not reoccur. However, one patient who had bilateral eminectomy previously experienced an episode of unilateral subluxation.

In Japan, Takahashi et al. [35] first reported the efficacy of autologous blood injection in a compromised patient who was unable to receive surgery in 2003. In 2007, Kato et al. [22] reported a case of recurrent TMJ dislocation in a 84 year old female patient who was treated with autologous blood transfusion. Following treatment, although one of her condylar processes was beneath the articular eminence, the dislocation had improved and the patient was able to close her mouth without any difficulty.

In a study performed in 2009 by Machon et al. [12], 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 which resulted in a successful outcome of eighty percent and required no further treatment at their 1-year follow-up. Another study which was performed

in the same time period in 2009 by Pinto et al.[8] reported the technique of intra-articular injection of autologous blood, together with support from an elastic bandage (Caromed face lift bandage) of a type designed for use after a face lift, in a medically unfit 83-year-old woman who had presented repeatedly with recurrent bilateral dislocations of the temporomandibular joint (TMJ). Postoperatively, she had remained comfortable with no further dislocations for over 12 months. The elasticity of the bandage allowed sufficient mouth opening for the patient to eat, while reducing the likelihood of further dislocation.In 2010, Daif et al. [10] treated thirty patients having chronic recurrent TMJ dislocation. He randomly divided them into 2 equal groups (15 patients in each). Before the blood injection, the joint space was flushed with 4 ml of saline.Group A was treated only by autologous blood injection into the superior joint space (SJS), whereas group B received autologous blood injections to the SJS and the pericapsular tissues (PT). The results at the end of one year follow up period revealed that injection of autologous blood to the SJS and PT gave a higher success rate (80%) than its injection only into the SJS (60%).

In 2012, Candirli et al. [7] investigate the effect of the autologous blood injection (ABI) for chronic recurrent temporomandibular joint (TMJ) dislocation using magnetic resonance imaging (MRI). evaluated the pathophysiology of the ABI using magnetic resonance imaging (MRI). MRI images were taken preoperatively and 1 month postoperatively. One month after the injection, TMJ dislocations were not observed in MRI evaluation of any patients. A significant structural change that was caused by ABI was also not observed.

In 2013, Hegab et al. [36] treated forty-eight patients with chronic recurrent dislocation of the TMJ who were randomly assigned to 1 of 3 equally sized groups. Patients in the first group were treated with injection of autologous blood (ABI) alone into the superior joint space and the pericapsular tissues. Those in the second group were treated with intermaxillary fixation (IMF) alone for 4 weeks, and those in the third group were treated with ABI and IMF for 4 weeks. The best clinical results were given by the group treated by a combination of ABI and IMF. He also felt that IMF as an adjunct to ABI could help in the formation of mature fibrous tissue because excessive mouth opening could disturb the integrity of the fibrosis which could result in recurrent chronic dislocation. The main limitations of this combined technique were that IMF would cause a certain level of discomfort for patients and could not be used in edentulous patients. In 2016, Yoshioka et al. [37] designed a study protocol to evaluate the efficacy, safety, and stability of TMJ autologous blood injection for the treatment of recurrent TMJ dislocation to standardize the procedure. The follow-up parameters included clinical examination, measuring the maximal incisal opening, assessment of possible complications such as pain, facial nerve paralysis, frequency of condylar dislocation, recurrence rates and evaluation of the TMJ region by panoramic TMJ projection.

Mechanism of action

It has been suggested that the concept of autologous blood injection to the TMJ follows the pathophysiology of bleeding in the TMJ area, because trauma to the condylar region or TMJ surgery may lead to fibrous or bony ankylosis [12]. Therefore, blood injection into the TMJ cavity and pre capsular region may generate a bed for fibrous tissue and scar formation in the TMJ area, which may lead to formation of adhesion in the joint space [10,22].

Blood injections to the TMJ follow the pathophysiology of bleeding in joints elsewhere in the body such as the knee or the elbow [38]. Initially, the joint capsule and the periarticular tissues are distended by blood that is introduced and during the next few hours or days, an inflammatory reaction takes place [39]. 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 the adjacent tissues. This reduces their compliance, and the joint becomes physically more difficult to move. Following this, a combination of an organized blood clot and loose fibrous tissue is formed, which maintains the joint stiffness. In the end, this tissue matures and causes a permanent limitation of movement of the joint [38]. Localized contraction [39] is caused due to exposure of cartilage to blood that results in disturbance of cartilage matrix

turnover [40] and in a decrease of chondrocyte metabolism.

Although after a trauma to the TMJ, range of motion exercises are done to avoid the concentration of inflammatory mediators present in the joint, in the case of this deliberate hemarthrosis, the intent is the exact opposite [12]. 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[41,42] with limitation in movement of the mandible and tightening of capsular ligaments. This avoids early stretching of the newly formed fibrous tissue and ceases dislocation of condyles [42]. Some authors however, believe that even a brief exposure of cartilage to intra-articular blood may lead to permanent joint destruction, [40] such as degenerative joint damage [43], chondrocyte apoptosis, [40] and cartilage degeneration, which may ultimately lead to joint destruction [43]. However, this amount of blood is similar to the amount present after an open TMJ procedure, and thus any subsequent joint damage is comparable.

Advantages of autologous blood transfusion in the treatment of chronic recurrent TMJ dislocation

This technique can be performed in an out-patient clinic under local anesthesia and does not require hospitalization [10]. It is a safe, successful technique, minimally invasive and cost-effective technique. An operator who has experience in manipulation of the temporomandibular joint can easily perform this technique [22]. It does not cause any foreign body reactions. Repeated treatment can be performed with no complications [21]. With this technique there is no need for surgical incisions and tissue dissection. Thus, there is a decrease in postoperative complications such as facial nerve injuries, pain, and infection [6].

Disadvantages of autologous blood transfusion in the treatment of chronic recurrent TMJ dislocation

The needle used for blood injection is advanced blindly that can go in an improper place and damage surrounding tissues.Serial blood injection may also be needed[1].Since its mechanism of action is still unclear and blood injection into the articular cavity could result in degeneration of the articular cartilage and formation of fibrous or bony ankylosis, this procedure should not be routinely used in younger individuals with a longer lifespan, patients with rheumatoid arthritis, patients with articular degeneration [22].A period of restricted motion or IMF following the procedure may be needed [1].

CONCLUSION

The technique of autologous blood transfusion has proved to be successful in management of chronic recurrent TMJ dislocation. On reviewing literature related to the clinical use, success and efficacy of this technique, most state that it is a simple, safe, minimally invasive and cost-effective method. Therefore, an oral and maxillofacial surgeon should consider attempting this approach prior to performing an invasive surgical procedure in patients presenting with recurrent chronic TMJ dislocation. However, there is still some disparity regarding its mechanism of action which is still unclear and blood injection into the articular cavity could result in degeneration of the articular cartilage.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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