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Platelet Rich Fibrin Injection with Arthrocentesis for treatment Tempromandibular Joint Internal Derangement of

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Abstract

Background and objective: Tempromandibular joint disorders are common clinical problems usually with pain, joint sound and limitation of mouth opening. Platelet rich fibrin injection is natural source of autologous growth factors which are benefit in alleviating joint pain and inflammation. This present study was conducted to evaluate the clinical efficacy of arthrocentesis with platelet rich fibrin injection in the treatment of internal derangement of tempromandibular joint.

Method: Forty patients were present with tempromandibular joint disorders are enrolled in this study regardless of age, sex. Two cc of Platelet rich fibrin was injected into superior joint space immediately after Tempromandibular joint artherocentesis. The patients were followed up postoperatively at 2nd week, 3rd month and 6th month to evaluate pain by visual analogue scale, clicking and maximum mouth opening.

Result: There were 4 males and 37 females, the age range from (17 - 50) years. Platelet rich fibrin injection was significantly effective in alleviating pain at the 2nd week post operatively (mean±SD 0.88±0.335) and on 3rd (0.45±0.5), 6th month (0.25±0.5) was highly significant. For the degree of mouth opening; it was more than 35 mm at 2nd week post-operatively in 26 patients, 3rd month in 37 patients and 6th month in 38 patients which was highly significant, but there was no significant improvement in joint sound in the three times interval.

Conclusion: Arthrocentesis with PRF injection have a very good effect in improving pain relief and maximum mouth opening, but have no effect in improving joint sound which is mechanical problem that related to disc position.

Key words: Platelet rich fibrin injection, Tempromandibular joint disorders, Artherocentesis.

Introduction

Temromandibular joint disorders can describe a number of clinical problems characterized by facial pain in the region of the TMJ and/or the muscles of mastication, limitation or deviation in the mandibular range of motion, and TMJ sounds during jaw movement and function[1]. These disruptions in disc-condyle relation in TMJ can cause an increase in the physiological internal articular pressure (IAP) of the TMJ and collapse of blood perfusion, which leads to erosion of the synovial membrane and to increases in hypoxic-reoxygenation cycles. which is associated with non-enzymatic release of highly reactive oxidative species (superoxide anions and hydroxyl anions) that causing damage to key biomolecules in the synthesis of hyaluronic acid (HA) and synovial fluid (SF), and these lead to reduced viscosity of the SF increases joint friction, adherence, and rupture of articular surfaces, thus initiating a state of chronic inflammation, synovitis, capsulitis, and ultimately, fibrous adhesions[2].Temporomandibular joint (TMJ) arthrocentesis consists of lavage of the upper joint space of the TMJ, aiming primarily to remove

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necrotic tissue, blood and pain mediators from the joint[1]. Platelet rich plasma (PRP) has been described as a bio-supplement, as it's the natural source of autologous growth factors (GFs)for TMJ derangement with properties including anti-inflammatory, analgesic, antibacterial, restoration of intra-articular HA properties, and balance in joint angiogenesis[3].More recently, Choukroun developed in 2001 a second generation platelet concentrate (platelet rich fibrin (PRF), which considered as a new generation of or alternative to PRP, with numerous advantages and without the need for anticoagulants and blood activators[4]. The present study was designed to determine the clinical efficacy of arthrocentesis with platelet rich fibrin injection in the treatment of internal derangement of tempromandibular joint for pain, joint sound and inter incisal opening.

Patient and methods

A prospective, randomized, clinical study was set. The diagnosis was depended mainly on history and clinical examination. All patients were treated at the department of Oral and Maxillofacial Surgery/ Rizgary Teaching Hospital /Erbil- Iraq, from March 2019 to February 2020. Patients were selected according to the following criteria, inclusion criterias include pain in TMJ, joint sound and inter incisal opening less than 35 mm. The exclusion criterias include autoimmune diseases and blood dyscrasias, patients with previous TMJ surgery, patients with mechanical obstruction to mouth opening, neurologic disorders and temromandibular disorder diagnosed as diffuse myofacial pain. Clinically all patients were followed up post operatively, from the day of operation for six months at first two week , third and sixth month post operatively to evaluate pain by (VAS) visual analogue scale, The pain scale was 5 cm long, subdivided into five equal parts, one end corresponding to no pain, the other to extremely severe pain[5] Table (1), Tempromandibular joint clicking was recorded by score: (0 =no sound heard even by stethoscope, 1=mild sound heard just by stethoscope , 2=moderate click that can be felt by palpation, and 3=severe sound audible by the patient or others)[6],and maximum mouth opening by ruler measuring inter incisal opening as less than 35 mm considered limited mouth opening[7] and Acetaminophin (Dolipran) tablets 1000 mg three times a day for 5 days used post-operatively as an analgesic medication.

Table (1): VAS for pain intensity assessment

NO	Pain intensity	Patient experience
0	No pain	The patient feels well
1	Slight pain	If the patient is distracted he or she does not feel the pain
2	Mild pain	The patient feels the pain even if concentrating on some activity
3	Sever pain	The patient is very disturbed but nevertheless can continue with normal activities
4	Very severe pain	The patient is forced to abandon normal activities
5	Extremely severe pain	The patient must abandon every type of activity and feels the need tolie down

Skin surface of the pre-auricular region disinfected with antiseptic solution. An auriculotemporal nerve block was performed with 1.8 ml lidocaine 2% with adrenaline, and waited for 5 minutes, during this period; patient reported eliminated of pain or significantly decreased[8]. Accurate placement of 18 gauge needles for arthrocentesis was aided by drawing a line from the lateral canthus of the eye to the midpoint of tragus of the ear (HolmlundHellsing line). The input needle was placed 2 mm below this line at a point 10 mm forward of the mid-tragus. When properly positioned, as indicated by the feeling of back pressure within the syringe then the joint was distended with 2 mL of Ringer lactate, the output needle was inserted into superior joint space 2 mm bellow the first needle. When both needles correctly positioned in the joint, the injected 20 cc of ringer lactate will exit through the other needle, Figure (1). After that, ten cc of blood collected from the antecubital vein through an aseptic technique of blood collection, using vacutainer tubes (sterile uncoated plastic tubes) without additive and immediately centrifuged. The low speed centrifugation protocol uses to obtain liquid PRF which is 700 rpm. For 3 min. For liquid PRF, only two layers are obtaining after centrifugation: the red blood cells at the bottom and the liquid PRF at the top of the tube which is a yellowish layer, 2 cc of liquid PRF withdrawn into a 3 mL or 5-mL syringe.

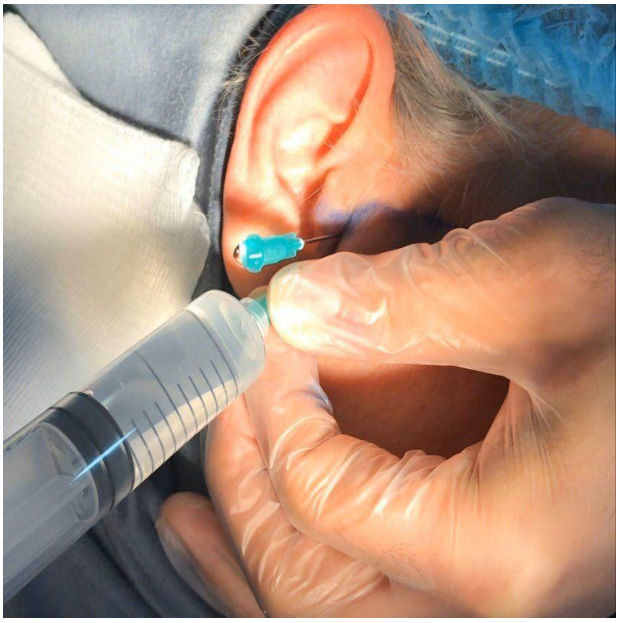

Figure (1): TMJ arthrocentesis with Ringer lactate

Immediately after arthrocentesis, maximum 2 cc of PRF injected to the joints, as 1.5 cc into the superior joint space (SJS) and 0.5 cc distribute in the retrodiscal tissue (RT) and pericapsular area, to restore the morphology of elongated, tear or rapture retrodiscal tissue as a result of internal derangement that caused by disturbed arrangement of intra joint structures [4, 9]., Figure (2).

Figure (2): PRF injection into the superior joint space (SJS)

Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 20). For descriptive statistic and All the steps of procedure were explained in detail to the patients were agreed to share and gave their signatures Kurdish or Arabic in the either prepared consent following, and the patients who give the Paired sample t-test was used to assess the reliability of data. A p-value of ≤0.05 was considered as statistically significant. sign of consent in Kurdish or Arabic the instruction of the ethical committee in Kurdistan Board of Medical Specialists (KBMS) for the treatment were involved to the study.

Results

There were 40 patients 4 males and 36 females. The mean age (± SD) was 25.6± 7.13 years, ranging from 17 – 50 years. The median age was 23 years. 25 TMJ was on right side and 15 TMJ of left side; i-PRF was effective in alleviating pain as the 2nd week post operatively total number of patients complaining of pain was down to 35 patients as p-value was 0.023 its significance and between 3rd to 6th month became 18 and 10 patients as the p-value became (0.00) was highly significant, Table (2),

Table (2): Proportion of patients having pain (VAS) following TMJ arthrocentesis with PRF injection

Variables	Pre-operative	Post-operative 2 weeks	Post-operative 3 months	Post-operative 6 months
mean	1	0.88	0.45	0.25
S.D	0	0.335	0.5	0.43
p- value		0.023	0.00 0.00	

P-Value significance P-Value highly significance

The degree of mouth opening became more than 35 mm at 2nd week was 26 patients, 3rd month was 37 patients and 6th month was 38 patients post-operatively and the p-value (0.00) was highly significance, Table (3).

Table (3): Proportion of patients having maximum mouth opening more than 35 mm following TMJ arthrocentesis with PRF injection

Variables	Pre-operative	Post-operative 2 weeks	Post-operative 3 months	Post-operative 6 months
mean	0	0.67	0.9	0.95
S.D	0	0.47	0.3	0.22
p- value		0.00	0.00	0.00

P-Value highly significance

But for the effect of PRF injection on joint sound, there was no improvement in joint sound in three times interval, that's why p-value was inapplicable, because the joint sound was constant, no improved dates recorded, Table (4).

Table (4): Proportion of patients having TMJ Clicking following TMJ arthrocentesis with PRF injection

Variables	Pre-operative	Post-operative 2 weeks	Post-operative 3 months	Post-operative 6 months
mean	1	1	1	1
S.D	0	0	0	0
P value		0	0	0

P-Value not applicable, because no improved data recorded

Discussion

The purpose of arthrocentesis is to reduce the negative pressure in disc through the lavage and wash out the inflammatory mediators[10]. On the other hand, PRF injection focuses on the induction of functional recovery by means of regenerating weakened tissues, and its anabolic effect on synoviocytes lead to restore hyuronic acid levels thereby enhancing cartilage protection and joint lubrication[11]. According to age from 40 patients ranging from 17 – 50 years the median was 23 years. The explanation for this some group of ages more prone to TMD, this could be due to social tensions at this group of age, and the result was agreed with Ismail W 2017[12].And about sex distribution, evidence for females highly significance to males it was 9:1 female to male ratio This can is supported by studies suggesting that females suffer higher levels of pain and dysfunction, and have a greater persistence of symptoms over a longer time, which showed functional estrogen receptors have been identified in the female TMJ but not in the male TMJ. Estrogen may also promote degenerative changes in the TMJ by increasing the synthesis of specific cytokines, whereas testosterone may inhibit these cytokines[13]. Results are in agreements with studies done by Ismail[12] and Lippross et al[14]. Females suffering more problems than male due to marital status and menstruation cycle may indirectly lead to tempromandibular joint internal dearrangment. For pain management at the first 2 weeks post-operative data recording shows significance difference, these due to that PRF take 10 days, But at 3rd month and 6th month data recording show highly significant because at that time the high concentration of IL-4, an anti-inflammatory cytokine found in PRF, controlling influences on inflammation by inhibiting MMP 1–3 and neutralizing all transduction pathways from IL-1β, TNF-α and prostaglandins[4]. For the degree of mouth opening management; all patients got benefit show highly statistically significance difference, the explanation for that PRF reduced the levels of all markers related to the inflammation of TMJ; intra-articular injection of PRF helped to maintain the integrity and to regenerative effect of the chondral surface and thereby facilitated joint movement [14- 15], this result agrees with Dohan[3,] Albilia et al[4], Ismail[12] and Hassan[16]. For the clicking, joint sound was constant, no statistical applicable because clicking record was constant. The

result agreed Albilia et al[4], but disagree Ismail[12] and Hassan[16], because when clicking sound related to disc position, it's a mechanical problem which is not improved with TMJ arthrocentesis or intra articular injections but if clicking sound related to disc sticking which is alteration in normal smooth and harmonious movement of TMJ articular disc without displacement, they got benefit to TMJ arthrocentesis and/or intra articular injections[9].

Conclusion

Arthrocentesis with PRF injection have a very good effect in improving pain and maximum mouth opening, but have no effect in improving joint sound which is mechanical problem that related to disc position.

Conflicts of interest

There were no conflicts of interest.

References

1. Al-Kamali R, Saeed S. Arthrocentesis versus conservative treatments for TMJ dysfunctions: A preliminary prospective study.Zanco J. Med. Sci.2014; 18(2):739-45.
2. Nitzan D, Marmary Y, The anchored disc phenomenon: A proposed etiology for sudden-onset, severe, and persistent closed lock of the temporomandibular joint. J. Oral Maxillofac. Surg., 1997; 55(8): 797-803.
3. Dohan D, Choukroun J, Diss A et al. Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part II: Platelet-related biologic features. Oral Surgery, Oral Med. Oral Pathol. Oral Radiol. Endodontology. 2006; 101(3): 45–50..
4. Albilia JB, Vizcaíno CH, Weisleder H et al. Liquid platelet-rich fibrin injections as a treatment adjunct for painful temporomandibular joints: preliminary results. Cranio. 2018; 19:1-3.
5. Merchant R, Khalid I, Natrajan S, Galinde J. Comparative Evaluation of Clinical Efficacy of hyluronic acid spray versus normal saline spray on swelling, pain and trismus after surgical extraction of impacted mandibular third molar-A randomized controlled split mouth. Int J Sci Res 2018;7(9):152-9.
6. Onder ME, Tuz HH, Kocyigit D et al. Long term results of arthrocentesis in degenerative temporomandibular disorders. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009 ;107(1):e1–5
7. CömertKiliç S, GüngörmüşM, Sümbüllü MA. Is arthrocentesis plus platelet-rich plasma superior to arthrocentesis alone in the treatment of temporomandibular joint osteoarthritis? A randomized clinical trial. J Oral Maxillofac Surg. 2015; 73(8):1473–83.
8. Okeson JP. Management of tempromandibular disorders and occlusion. 7th ed. China: Elesevier; 2013
9. Brennan PA, Schiephake H, GE Ghali, Cascarini L. Maxillofacial Surgery. 3rd ed. Italya: Elesevier; 2017
10. Nitzan DW, Dolwick MF, Martinez GA. Temporomandibular joint arthrocentesis: a simplified treatment for severe, limited mouth opening. J Oral Maxillofac Surg 1991; 49: 1163-7
11. Xie X, Zhang C, Tuan RS. Biology of platelet-rich plasma and its clinical application in cartilage repair and matrix biosynthesis. Arthritis Res Ther. 2014; 16:204- 19.
12. Ismael W, Abdul Lateef T, Shumean M. An Analysis of the Efficacy of Platelet-Rich Plasma Injections on the Treatment of Internal Derangement of a temporomandibular Joint. J Bagh College Dentistry. 2017; 29 (3): 39-44.
13. Ribeiro-Dasilva MC, Line SR, dos Santos MC et al. Estrogen receptor-α polymorphisms and predisposition to TMJ

disorder. The Journal of Pain. 2009;10(5):527-33.

14. Lippross S, Moeller B, Haas H, et al: Intraarticular injection of platelet-rich plasma reduces inflammation in a pig model of rheumatoid arthritis of the knee joint. Arthritis Rheum. 2011; 63(11): 3344-53.

15. Al-Belasy FA, Dolwick MF. Arthrocentesis for the treatment of temporomandibular joint closed lock: a review article. Int J Oral Maxillofac Surg. 2007; 36 (9):773–82.

16. Hassan EF., Ali TM, Abdulla N. The clinical efficiency of platelet rich plasma in the treatment of temporomandibular joint disorders. Alex Dent J. 2016; 41(3): 226-31