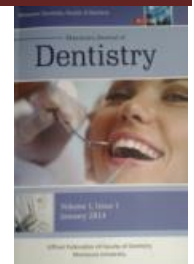




## Clinical Efficacy of Injectable Platelet Rich Fibrin for the Treatment of TMJ Disc Displacement with Reduction



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### Abstract:

**Purpose:** the aim of this study was to evaluate the efficiency of intra-articular injection of injectable platelet rich fibrin (i-PRF) in TMJ disc displacement with reduction.

**Materials and Methods:** Thirty patients suffered from temporomandibular joint internal derangement (TMJID) were included in the study 1.5 ml i-PRF into the TMJ. The patients were clinically evaluated preoperatively and postoperatively at the intervals of 1 week, 3, and 6 months.

**RESULTS:** The differences between preoperative and postoperative status in all the measured parameters were statistically significant throughout the postoperative period.

**CONCLUSION:** i-PRF injection is a safe and effective method in the treatment of TMJID.

**KEYWORDS:** Temporomandibular joint disorder; Internal derangement; Injectable Platelet Rich Fibrin; Disc displacement with reduction

### Introduction

Internal derangement is the most common noninflammatory abnormality of the TMJ, being observed even in asymptomatic subjects in which the term derangement refers to an alteration in the normal pathways of motion of the TMJ that largely involves the function of the articular disc.[1]

Currently, the therapeutic management of degenerative disorders of the TMJ is focused on alleviating the functional pain and establishing normal range of mandibular motion in these patients.[2] Platelet-rich plasma is a first-generation platelet concentrate from centrifuged blood with a weak fibrin network in a liquid or gel form used after activation by thrombin and calcium[3]. One of the reported drawbacks of PRP is the additional use of anticoagulants, known suppressors of wound healing. A second generation platelet concentrate termed platelet rich fibrin (PRF) was developed to further improve wound healing in comparison to PRP.[4]

Standard PRF contains a 3-dimensional fibrin matrix following centrifugation, the pioneering development of the low speed centrifugation concept (LSCC) introduced the development of a new formulation of PRF whereby a liquid formulation of PRF could be obtained for injectable purposes (i-PRF) without using anticoagulants.[4]

Recently the effects of PRF have been documented in several systematic reviews demonstrating its long-term effects on tissue-wound healing.[5] Two of the main documented advantages of PRF include the fact that it contains host immune defense cells (leukocytes) which act to fight infection.[6] I-PRF is highly enriched with platelets, leukocytes and growth factors, which could provide a significant benefit for the regeneration process.[5]

As a result of its biological potential, it was of interest to evaluate the effect of intra-articular injection using iPRF in the management of patients with TMJ ID.

### MATERIALS AND METHODS

#### Patient Selection and Study Design:

Thirty patients suffered from TMJ disc displacement with reduction were selected from the outpatient Clinic in the Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Mansoura University.

#### Inclusion Criteria:

1. Painful joint.
2. Either normal or limited mouth opening.
3. Co-operative patients.

#### Exclusion Criteria:

1. Patients with previous invasive TMJ surgical procedures.
2. Patients receiving anticoagulation treatment, non-steroidal anti-inflammatory drugs within 48 hours preoperatively, corticosteroid injection at treatment site within one month or systemic use of corticosteroids within 2 weeks.
3. Patients suffering from any systemic diseases, platelets function disorders or fibrinogen deficiency.

#### Methods:

##### I. Preoperative phase:

- A thorough medical history from the patients was recorded and an extra and intra oral examination was performed.
- Magnetic Resonance Imaging was required to confirm the diagnosis of internal derangement with reduction.

##### II. Operative phase:

- I-PRF was prepared by collecting 9 ml venous blood from each patient in a plain glass centrifuge tube then placed in a centrifuge machine at 700 rpm for 3 minutes.
- 1.5 i-PRF was injected into the upper joint space at 10 mm from the middle of the tragus and 2 mm below the line.

##### III. Post-Operative Phase:

- Instructions for 3 days of soft diet and then gradual resume to normal diet.
- Prescription of Amoxicillin/Clavulanate Potassium 1g tablet one tablet every 12 hrs for 5 days to protect against any possibility of infection.

##### IV. Follow-up Phase:

Re-evaluation was done at 1 week, 3 months and 6 month intervals.

**Evaluation**

At each follow up appointment, the evaluation criteria included:

1. Maximum interincisal opening (MIO).
2. Range of lateral and protrusive movements.
3. The intensity of pain: by Visual Analogue Scale (VAS).
4. Patient satisfaction questionnaire.
5. Presence or absence of TMJ sounds.
6. Presence or absence of joint tenderness on palpation

**RESULTS**

The study comprised 30 patients 23 females and 7 males with age ranged from 18 to 55years with median age of 24 years.

There was a statistically significant difference ( $p < 0.0005$ ) between the repeated measures of pain score.

There was a statistically significant difference in the distribution of the clicking status in different time periods with significantly higher proportion of the presence of clicking during iPRF as compared to follow up periods.

Regarding the MIO, there was a statistically significant increase over time. Pairwise comparisons revealed no significant difference between baseline MIO and after first iPRF and also between 3month follow up and 6month.

As regard to the protrusive movement a statistically significant increase in protrusive movement over time. Pairwise comparisons revealed significantly lower baseline protrusive movement as compared to movements during all other time periods.

The majority of patients require one or two injections for tenderness to be absent. A statistically significantly higher patient satisfaction score in responders (90 %) as compared to non-responders (10%).

**Individual questions in responders:**

Question	SS	S	N	D	SD
Jaw joint pain relieving	13	14	0	0	0
Mouth opening	13	11	2	1	0
Clicking improvement	8	17	0	2	0
Speed of response to treatment	12	12	1	2	0
Headache improvement	8	18	1	0	0
Duration of treatment	11	12	3	1	0
Desire of continuing treatment	20	7	0	0	0
Cost of treatment	25	2	0	0	0
Mastication pain improvement	9	16	1	1	0

SS=strongly satisfied, S=satisfied, N=neither, D=dissatisfied, SD= strongly dissatisfied.

**Discussion**

In the present study, clinical assessment showed statistically significant decrease in mean VAS scores, clicking sound and tenderness, also a statistically significant increase in the mean MIO and in the mean of the lateral movements throughout the evaluation intervals of the study.

A rapid positive response in the "Responders" (90%) was observed as early as four to five days after the first injection and this percentage coincide with that of Khallaf et al's study which use PRP.[7] This suggests that PRF requires several days for its positive effects to occur and that can be explained by spontaneous clotting of liquid PRF ( $\pm 15$  min), which preserves cells and growth factors in the articular space for a prolonged release[8] which coincides with **albilal et al** study who use i-PRF, however, responders in his study were 69% and this may be due to larger sample size. The slow release of growth factors from solid PRF matrices was demonstrated in vitro previously [9]

There was a statistically significant difference between the repeated measures of pain score. With the end of i-PRF injections, the mean pain score reduced from 6.103 to 0.103 for responders. These results are comparable to those applying PRP to the TMJ[10] **Ismael et al**[11] and **Hassan et al**[12]

Thus, it is feasible to believe that in some patients, liquid PRF can induce a natural lavage of synovial fluid

by delivering of immune cells for joint debris debridement and repair following restitution of the synovium's capillary network.[8], [13]–[15].

In this study, all patients were suffering from TMJ clicking. During i-PRF injections visits 15 of 27 patients experiences total absence of clicking, at 6 months follow up clicking recurred in only one patient. There were statistically significant difference in the presence of the clicking between baseline and 6 months follow up and this result is in agreement with **Al-Delavme et al**[16], but in contrast **Hassan et al**. [12] We suppose that may be due to the lubricating action of i-PRF after coagulation within 15 minutes from injection.

The mean difference in mouth opening after 6 months was 8.5mm and there was high statistically significant ( $p < 0.0005$ ). Regarding the range of mandibular movements including lateral movements and protrusive movement, there was statistically significant increase in right and left lateral and protrusive movements over time ( $p < 0.0005$ ). These results are in agreement with **Giacomello et al**. [10] As regard mandibular range of motion our results is in accordance with studies of using PRP as **Lin et al** study. [10] and **Hassan et al**. [12]

**CONCLUSION:**

TMJ Intra-articular injection using autologous i-PRF have been found to be an effective method for treatment of TMJ internal derangement with reduction

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