

# Comparison of Injectable Platelet Rich Fibrin and Prolotherapy in Internal Derangement of the Temporomandibular Joint

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## Abstract

**Background:** This study was conducted to compare the efficacy of injectable-platelet rich fibrin (I-PRF) and prolotherapy in internal derangement of temporomandibular joint (TMJ). **Materials and Methods:** The study was conducted on 32 TMJs with internal derangement of TMJ. Group 1 – IPRF treatment (intra-articular injections) on 16 TMJs with internal derangement of TMJ, Group 2 – Prolotherapy treatment with 30% dextrose solution on 16 TMJs with internal derangement of TMJ. The pain was recorded through a visual analog scale. The obtained I-PRF was aspirated from the vacutainers in a 5 mL plastic syringe and 1.5–2 mL of PRF was then injected into the superior joint space of the lavaged joints. A reference line was drawn from the middle of the tragus marked to the outer canthus of the eye. The two points for needle insertion was then marked. **Results:** Intergroup comparison of pain, mouth opening, and jaw movement at 1 day postoperatively shows that no significant difference was seen in the pain score, mean mouth opening in mm, and jaw movements among two study groups 1-day postoperatively when compared using independent *t*-test as  $P > 0.05$ . Intragroup comparison of difference in pain score from baseline to different study intervals in Group II subjects showed that significant reduction was seen in the mean pain score from baseline to day 1, day 7, and 1 month when compared using paired *t* test as  $P < 0.05$ . **Conclusion:** It was concluded that I-PRF and prolotherapy are successful techniques for management of symptoms associated with the internal derangement of the TMJ as both techniques showed a significant improvement in non-assisted mouth opening and significant decrease in pain intensity.

**Keywords:** Injectable platelet rich fibrin, Pain, Prolotherapy, Temporomandibular joints.

## INTRODUCTION

The temporomandibular joint (TMJ) allows movement of the mandible, relative to the maxilla. The mandibular part of the joint is composed of the mandibular condyle. The articulating head of the condyle is oblong which is longer mediolaterally than anteroposteriorly.<sup>[1,2]</sup> In between the temporomandibular condyle and fossa are an articular disc which is made of dense fibrous connective tissue. It has a biconcave shape, with the thinnest portion near its center. The posterior border of the articular disc is thicker than the anterior border and the medial border is thicker than the lateral border. The thicker borders help in keeping the disc in place on top of the round condylar head.<sup>[3-5]</sup> Temporomandibular disorders represent a wide range of functional changes and pathological conditions affecting the TMJ, masticatory muscles, and other components of the orofacial region.<sup>[6]</sup> It has been stated by several researchers that platelet-rich plasma was highly efficient in the management of temporomandibular disorders. As the second-generation platelet concentrates known as platelet rich fibrin (PRF) was developed and proved to enhance wound healing.<sup>[7,8]</sup> Thus, the

injectable-PRF (I-PRF) was chosen to be injected in the TMJ cases. This was because it has the following advantages: It is high content of fibrin and platelet growth factors, its fluidity without the use of any anticoagulant materials, and has considerable working time which allows its injection before gelation.<sup>[9,10]</sup> The PRF improved the integrity of the capsule and ligaments, where it significantly decreased the distance at which the condyle travelled anteriorly and also improved the condylar position in the glenoid fossa at maximum mouth opening. This study was conducted for comparing the efficacy of the I-PRF and prolotherapy (with 30% dextrose solution) in internal derangement of TMJ.

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The aim of our study was to compare the efficacy of I-PRF and prolotherapy in internal derangement of TMJ. The intended objectives were to assess the post-operative effects after the two therapies and to determine clinical outcome of two therapies in terms of movements of the jaw and maximum mouth opening and pain (visual analog scale [VAS] score).

## MATERIALS AND METHODS

The study was conducted in the Department of Oral and Maxillofacial Surgery, Shree Bankey Bihari Dental College and Research Centre, Ghaziabad, Uttar Pradesh, India. Ethical clearance number was SBBDC/2020/152118-A dated December 22, 2020. Data were recorded on case report forms including: Age, gender, and tooth type according to the evaluation criteria. The study was conducted on 32 TMJs with internal derangement of TMJ. All patients were randomly divided into two groups; Group 1 – IPRF treatment (intra-articular injections) on 16 TMJs with internal derangement of TMJ, Group 2 – Prolotherapy treatment with 30% dextrose solution (intra-articular injections) on 16 TMJs with internal derangement of TMJ. The pain was recorded through a VAS. The subjects were asked to open their mouth maximally till no further opening was possible. The distance from the incisal edge of the upper incisor teeth to the incisal edge of the lower incisor teeth was measured using a calibrated ruler and the findings were recorded in ranges of millimeters. In Likert type psychometric assessment scale, the score values range from 1 to 10 to assess the jaw function and type of diet intake. I-PRF was prepared from 20 mL of blood withdrawn from the cubital vein of the enrolled patient, the withdrawn blood was then divided into two 10 mL vacutainers (plain tubes) which was then centrifuged for 2 min at 3300 rpm, the obtained I-PRF was then aspirated from the vacutainers in a 5 mL plastic syringe and 1.5–2 mL of PRF was then injected into the superior joint space of the lavaged joints. A reference line was drawn from the middle of the tragus marked to the outer canthus of the eye. The two points for needle insertion were then marked. The posterior entrance point was marked at a point 10 mm from the middle of the tragus and 2 mm below the canthotragal line; the anterior entrance point was placed 10 mm further forward along the line and 10 mm below it. With IPRF; the articular fossa (AF) as the point of injection was confirmed by manual palpation of its lateral edge (deepest concavity), about 10 mm anterior to the tragus and 2 mm below the canthal-tragal line. A 26 G needle was inserted in the TMJ capsule, 1.5-mL of liquid PRF was deposited into the superior joint space. After the first injection, patients were interrogated and self-evaluated their pain/dysfunction progress every two according to the evaluation criteria.

### With Prolotherapy

Patient's mouth is widely opened, the point where the 26 G needle penetrated the skin was about 10 mm anterior to the tragus of the ear and 2 mm below the tragocanthal line, then directed anteromedially to contact with medial wall of glenoid fossa and 1 mL of 30% dextrose solution was then deposited.

## Injection Technique

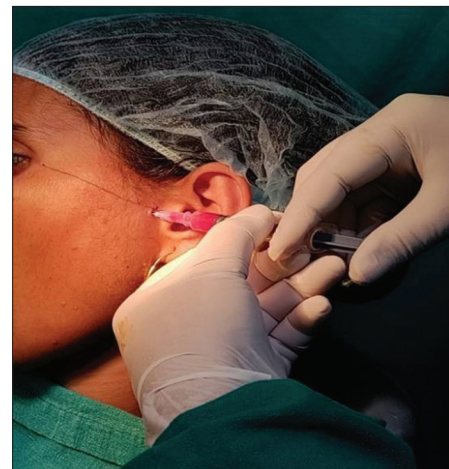
A blue line from the tragus to the lateral canthus was drawn and the manual palpation of the deepest concavity of the articular fossa (AF) was done which guided the clinician to the site of injection [Figure 1].

## RESULTS

The data were analyzed by Statistical Package for the Social Sciences (21.0 version). Level of statistical significance was set at  $P < 0.05$ . No significant difference was seen in the pain score, mean mouth opening in mm, and jaw movements among two study groups preoperatively when compared using Independent t test as  $P > 0.05$ . Intergroup comparison of pain, mouth opening, and jaw movement at 1-day postoperatively shows that no significant difference was seen in the pain score, mean mouth opening in mm, and jaw movements among two study groups 1-day postoperatively when compared using independent t-test as  $P > 0.05$ . Intragroup comparison of difference in pain score from baseline to different study intervals in Group II subjects showed that a significant reduction was seen in the mean pain score from baseline to day 1, day 7, and 1 month when compared using paired t test as  $P < 0.05$ . Intragroup comparison of difference in mouth-opening (mm) from baseline to different study intervals in Group I subjects showed significant improvement in mouth opening was seen from baseline to day 7 and 1 month when compared using paired t test as  $P < 0.05$ . From baseline to 1-day postoperatively, no significant improvement was appreciated. Moreover, no significant improvement was seen in mean dietary intake assessments among Group I subjects from baseline to 1 day, 7 days, and 1 month when compared using paired t test as  $P > 0.05$  at all the study intervals [Tables 1-3].

## DISCUSSION

For the diagnosis and management of TMJ internal derangements, updated guidelines and classification systems such as Wilkes staging and diagnostic criteria for TMDs are



**Figure 1:** Intra-articular injectable-platelet rich fibrin injection (Group 1)

widely available. The surgical treatment is done when the conservative treatment does not have any effects. As in when the painful symptoms as well as joint dysfunctions persist for a period of 3–6 months at a stretch. The surgical treatments for ID consist of the following methods such as arthrocentesis with single-needle technique or two-needle technique, intra-articular application of drugs such as glucocorticoids, sodium hyaluronate, platelet-rich plasma, I-PRF, prolotherapy etc., arthroscopy, and open joint surgery.<sup>[11-15]</sup> In few prominent and popular studies, the authors have done determination of the range of lateral and protrusive movement of the mandible was measured by the distance between the upper and lower midlines on lateral and forward movements.<sup>[16-19]</sup> In our study, assessment of jaw movements is done by the Likert Scale. They also evaluated the limited jaw motion and searched for presence of joint noises, judged clinically as no noise, early click, late click, and crepitus. Palpation for joint tenderness by intra-auricular and pre-auricular finger pressure. They have also done bimanual palpation for masticatory muscle tenderness. These were comparable to many other studies.<sup>[20-25]</sup> While

our study evaluated the pain score by VAS scoring criteria, our study gender-wise comparison of study population did not differ significantly among two study group as  $P > 0.05$  when compared using Chi-square test.<sup>[26-28]</sup> In the same way, no significant difference was seen in the mean age of the study groups when compared using Independent t test as  $P > 0.05$ . Significant reduction was seen in the mean pain score from baseline to day 1, day 7, and 1 month when compared using paired t test as  $P < 0.05$  in both the groups individually. In the same way, significant improvement in mouth opening was seen from baseline to day 7 and 1 month when compared using paired t test as  $P < 0.05$  in both the groups separately. Jaw movements among Group I subjects significantly improved from baseline to 1 day, 7 days, and 1 month when compared using paired t test as  $P < 0.05$  at all the study intervals; however, no significant improvement in jaw movements was appreciated among Group II subjects from baseline to 1 day, 7 days, and 1 month when compared using paired t test as  $P > 0.05$  at all the study intervals. In inter group comparison between the two groups, no significant difference was seen in the pain score, mean mouth opening in mm, and jaw movements preoperatively, 1-day postoperatively, 7 days, and 1-month postoperatively when compared using independent t test as  $P > 0.05$ . In the same way in intergroup comparison of dietary take assessment, we found no significant difference in dietary intake at pre-operative stage, 1 day, 7 days, and 1 month when compared among two study groups. Inferences were highly comparable to similar other studies.<sup>[29,30]</sup> Significant difference was appreciated in mean dietary intake assessments among Group I subjects from baseline to 1 day, 7 days, and 1 month when compared using Paired t test while no significant improvement in mean dietary intake assessments was seen among Group II subjects from baseline to 1 day, 7 days, and 1 month when compared using paired t test as  $P > 0.05$  at all the study intervals.

**Table 1: Group-wise distribution according to gender**

| Group    | Gender |        | Total |
|----------|--------|--------|-------|
|          | Male   | Female |       |
| Group I  |        |        |       |
| N        | 7      | 9      | 16    |
| %        | 43.8   | 56.3   | 100.0 |
| Group II |        |        |       |
| N        | 7      | 9      | 16    |
| %        | 43.8   | 56.3   | 100.0 |
| Total    |        |        |       |
| N        | 14     | 18     | 32    |
| %        | 43.8   | 56.3   | 100.0 |
| P value  |        |        |       |
| 0.639    |        |        |       |

**Table 2: Intergroup comparison of pain, mouth opening, and jaw movement preoperatively**

| Pre-operative | Group    | N  | Mean  | Standard deviation | Standard error mean | P value |
|---------------|----------|----|-------|--------------------|---------------------|---------|
| Pain          | Group I  | 16 | 5.250 | 2.8166             | 0.7042              | 0.641   |
|               | Group II | 16 | 5.688 | 2.4144             | 0.6036              |         |
| Mouth opening | Group I  | 16 | 37.13 | 6.032              | 1.508               | 0.244   |
|               | Group II | 16 | 34.31 | 6.760              | 1.690               |         |
| Jaw movement  | Group I  | 16 | 2.88  | 2.778              | 0.694               | 0.527   |
|               | Group II | 16 | 2.25  | 2.745              | 0.686               |         |

**Table 3: Intergroup comparison of pain, mouth opening, and jaw movement at 7-day postoperatively**

| Post-operative | Group    | N  | Mean  | Standard deviation | Standard error mean | P value |
|----------------|----------|----|-------|--------------------|---------------------|---------|
| Pain           | Group I  | 16 | 2.56  | 2.581              | 0.645               | 0.579   |
|                | Group II | 16 | 2.13  | 1.746              | 0.437               |         |
| Mouth opening  | Group I  | 16 | 39.13 | 5.608              | 1.402               | 0.911   |
|                | Group II | 16 | 38.88 | 6.859              | 1.715               |         |
| Jaw movement   | Group I  | 16 | 1.75  | 1.342              | 0.335               | 0.920   |
|                | Group II | 16 | 1.69  | 2.089              | 0.522               |         |

## CONCLUSION

I-PRF and prolotherapy are successful techniques for management of symptoms associated with the internal derangement of the TMJ as both techniques showed significant improvement in non-assisted mouth opening and significant decrease in pain intensity; however, prolotherapy showed no significant improvement in jaw movements as compared to IPRF. Double intra-articular injection of PRF and prolotherapy showed improvement in pain postoperatively after 1 month in two patients. Dextrose is a corn product and must not be utilized in patients with a corn allergy similarly an alternative local anesthetic must be used in patients who are allergic to lidocaine. In my study, no patient had shown allergy to dextrose or lidocaine.

## REFERENCES

- Young AL. Internal derangements of the temporomandibular joint: A review of the anatomy, diagnosis, and management. *J Indian Prosthodont Soc* 2015;15:2-7.
- Okeson JP. Management of Temporomandibular Disorders and Occlusion-e-book. Netherlands: Elsevier Health Sciences; 2019.
- Shengyi T, Xu Y. Biomechanical properties and collagen fiber orientation of TMJ discs in dogs: Part 1. Gross anatomy and collagen fiber orientation of the discs. *J Craniomandib Disord* 1991;5:28-34.
- Guarda-Nardini L, Manfredini D, Ferronato G. Temporomandibular joint total replacement prosthesis: Current knowledge and considerations for the future. *Int J Oral Maxillofac Surg* 2008;37:103-10.
- Hassan N, Sleem H, Nabil Y. Arthrocentesis with or without platelet rich plasma (PRP) in management of Tempromandibular joint internal derangement: Comparative study. *Oral Health Dent Sci* 2019;3:1-8.
- Wassell RW, Adams N, Kelly PJ. Treatment of temporomandibular disorders by stabilising splints in general dental practice: Results after initial treatment. *Br Dent J* 2004;197:35-41; discussion 31; quiz 50-1.
- Teama UA, Abdelmoneim HS. Evaluation of Injectable platelet rich fibrin for the management of Tempromandibular joint internal derangement. (Clinical evaluation). *Egypt Dent J* 2020;66:883-91.
- Dimitroulis G, Gremillion HA, Dolwick MF, Walter JH. Temporomandibular disorders. 2. Non-surgical treatment. *Aust Dent J* 1995;40:372-6.
- Neeli AS, Umarani M, Kotrashetti SM, Baliga S. Arthrocentesis for the treatment of internal derangement of the temporomandibular joint. *J Maxillofac Oral Surg* 2010;9:350-4.
- Ungor C, Atasoy KT, Taskesen F, Cezairli B, Dayisoylu EH, Tosun E, *et al.* Short-term results of prolotherapy in the management of temporomandibular joint dislocation. *J Craniofac Surg* 2013;24:411-5.
- Ghoneim NI, Mansour NA, Elmaghraby SA, Abdelsameea SE. Treatment of temporomandibular joint disc displacement using arthrocentesis combined with injectable platelet rich fibrin versus arthrocentesis alone. *J Dent Sci* 2022;17:468-75.
- Manafikhi M, Ataya J, Heshmeh O. Evaluation of the efficacy of platelet rich fibrin (I-PRF) intra-articular injections in the management of internal derangements of temporomandibular joints-a controlled preliminary prospective clinical study. *BMC Musculoskelet Disord* 2022;23:454.
- Elgazzaz MA, Khalifa FA, Amin G, Elsayed SA. The use of injectable platelet rich fibrin in the treatment of tempromandibular joint hypermobility. *Al-Azhar Dent J Girls* 2019;6:507-15.
- Nitzan DW, Dolwick MF. An alternative explanation for the genesis of closed-lock symptoms in the internal derangement process. *J Oral Maxillofac Surg* 1991;49:810-5; discussion 815-6.
- 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; discussion 1168-70.
- Dimitroulis G, Dolwick MF, Martinez A. Temporomandibular joint arthrocentesis and lavage for the treatment of closed lock: A follow-up study. *Br J Oral Maxillofac Surg* 1995;33:23-6; discussion 26-7.
- Alpaslan GH, Alpaslan C. Efficacy of temporomandibular joint arthrocentesis with and without injection of sodium hyaluronate in treatment of internal derangements. *J Oral Maxillofac Surg* 2001;59:613-8; discussion 618-9.
- Hase M. Adhesions in the temporomandibular joint: Formation and significance. *Aust Dent J* 2002;47:163-9.
- Nitzan DW. 'Friction and adhesive forces'--possible underlying causes for temporomandibular joint internal derangement. *Cells Tissues Organs* 2003;174:6-16.
- Hakala RV. Prolotherapy (proliferation therapy) in the treatment of TMD. *Cranio* 2005;23:283-8.
- Do Egitto Vasconcelos BC, Bessa-Nogueira RV, Rocha NS. Temporomandibular joint arthrocentesis: Evaluation of results and review of the literature. *Braz J Otorhinolaryngol* 2006;72:634-8.
- Brennan PA, Ilankovan V. Arthrocentesis for temporomandibular joint pain dysfunction syndrome. *J Oral Maxillofac Surg* 2006;64:949-51.
- Al-Belasy FA, Dolwick MF. Arthrocentesis for the treatment of temporomandibular joint closed lock: A review article. *Int J Oral Maxillofac Surg* 2007;36:773-82.
- Hauser RA, Hauser MA, Blakemore KA. Dextrose prolotherapy and pain of chronic TMJ dysfunction. *Pract Pain Manag* 2007;7:49-57.
- Laskin DM. Arthrocentesis for the treatment of internal derangements of the temporomandibular joint. *Alpha Omegan* 2009;102:46-50.
- Guarda-Nardini L, Manfredini D, Ferronato G. Short-term effects of arthrocentesis plus viscosupplementation in the management of signs and symptoms of painful TMJ disc displacement with reduction. A pilot study. *Oral Maxillofac Surg* 2010;14:29-34.
- Tatli U, Machon V. Internal derangements of the temporomandibular joint: Diagnosis and management. In: *Temporomandibular Joint Pathology-current Approaches and Understanding*. Vol. 20. London: IntechOpen; 2017. p. 47-67.
- Al-Saleh MA, Alsufyani NA, Lagravere M, Nebbe B, Lai H, Jaremko JL, *et al.* MRI alone versus MRI-CBCT registered images to evaluate temporomandibular joint internal derangement. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2016;122:638-45.
- Dasukil S, Shetty SK, Arora G, Degala S. Efficacy of prolotherapy in temporomandibular joint disorders: An exploratory study. *J Maxillofac Oral Surg* 2021;20:115-20.
- Torul D, Cezairli B, Kahveci K. The efficacy of intra-articular injectable platelet-rich fibrin application in the management of Wilkes stage III temporomandibular joint internal derangement. *Int J Oral Maxillofac Surg* 2021;50:1485-90.