

Original Research

Comparison between intra-articular platelet-rich plasma injection versus triamcinolone acetonide with local anesthetic injections in temporomandibular joint disorders: A clinical study

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ABSTRACT:

Introduction: Temporomandibular joint disorders such as joint hypermobility, internal derangement, degenerative joint disorders etc arise from problems with the occlusion, jaw joint and surrounding muscles of mastication. Various conservative treatment modalities like physiotherapy, splint therapy, arthrocentesis etc have been advocated in past but other treatment modalities including intra-articular autologous blood & corticosteroid injection are also used nowadays. Study aimed at comparing the efficacy of intra-articular platelet rich plasma injection with triamcinolone acetonide in local anesthetic injection in temporomandibular joint disorders was done. **Material & Method:** Sixteen patients with 23 joints in total were randomly divided into two groups; Group I: received intra-articular platelet rich plasma injection while Group II: received intra-articular triamcinolone acetonide with local anesthetic. Patients were then assessed for pain, inter-incisal opening and temporomandibular joint sound. **Results:** Group I: showed decreased pain on mouth opening as compared to Group II, inter-incisal-opening was increased in both groups to almost same extent and joint noises were also decreased in both groups. **Conclusion:** Both intra-articular injection of platelet rich plasma and triamcinolone with local anesthetic can serve as a safe, reliable and minimally invasive treatment modality in patients with TMD's.

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INTRODUCTION

Approximately, 35% of individuals in the whole world suffer from temporomandibular disorder within their lifetime, thereby making it one of the most common problem affecting individuals worldwide. Temporomandibular disorders which include internal derangement, degenerative joint disorder, acute or chronic recurrent dislocations and painful myofascial problems are disorders affecting the joint and the surrounding structures¹⁻². According to American Academy of Orofacial Pain (AAOP), disc displacement without reduction (DDWOR) i.e; closed lock is an altered or misaligned disc-condyle relationship that is maintained during mandibular translation. The disc is non-reducing or permanently displaced, and when the condition is acute it is characterised by sudden, marked limitation of mouth opening due to jamming or fixation of the disc secondary to disc adhesion, deformation or dystrophy³.

There are various treatment modalities for TMD's – the primary goal of all of them being improving the range of motion and relieving functional pain of the temporomandibular joint. Corticosteroids has anti-inflammatory properties and it exerts by inhibiting the prostaglandins synthesis which is an important mediator of inflammation, whereas platelet rich plasma is a concentrate of platelets and associated growth factors and has a potential healing properties through the recruitment, proliferation, and differentiation of cells, and tissue remodelling⁴⁻⁶.

AIMS & OBJECTIVES

To compare the efficacy of intra-articular injection of platelet rich plasma and triamcinolone acetonide with local anesthetic injection in patients with temporomandibular disorders in terms of following parameters: pain on jaw function, inter-incisal opening & joint noise.

MATERIALS AND METHOD

The present study was done in the Department of Oral & Maxillofacial Surgery, Govt. Dental College & Hospital, Srinagar after explaining the procedure to all the patients in their vernacular language & taking their written informed consent. Sixteen healthy subjects with a total of 23 joints having reducible anterior disc dislocation, as depicted by their history, clinical presentation (clicking, pain on jaw movement) correlated with the orthopantomograph of the patient were selected randomly. The subjects between the age group of 19 to 40 years, both male and female were included in the study. Subjects including medically compromised individuals, patients with limited mouth opening due to muscle trismus, trigger points, fibrous ankylosis and other inflammatory or connective tissue disease, severe anemia, thrombocytopenia, were excluded from the study.

MATERIALS USED

- Freshly prepared 0.6ml of platelet rich plasma injection.
- Commercially available injection of triamcinolone acetonide (0.5ml) mixed with 1ml of lignocaine hydrochloride.

METHOD

PREPARATION OF PRP

Approximately 5ml of blood is withdrawn from the patient & poured in a test tube containing an anti-coagulant (sodium citrate). The blood in test tubes is centrifuged at the rate of 2100rpm for 15 minutes. The plasma of the first harvest is again centrifuged at the rate of 3500rpm for 10 minutes to collect the PRP. Two syringes (27 gauge) each with 0.6ml of PRP is then withdrawn for injection into either joint.

TECHNIQUE

The pre auricular skin of the patient was first swabbed with an antiseptic solution. The cantho-tragal line was then marked with the injection point being 10mm anterior and 2mm below it. The area is then infiltrated with local anesthetic solution (2% lignocaine with adrenaline 1:80,000). Patients are divided into two groups:

Group I (8 Patients): Patients receiving 0.6ml of intra articular PRP injection.

Group II (8 Patients): Patients receiving intra articular 0.5ml of triamcinolone acetonide in 1ml of lignocaine. The mouth of the patient should be wide opened during the procedure and jaw movements including lateral and protrusive movements should be carried out following the procedure.

- The joints of the patients were evaluated based on the following parameters;
Joint Pain on a 10-cm visual analog scale (VAS).
Joint noise and
Maximal inter-incisal opening.

RESULTS

Joint pain was measured on VAS scale (0-10 score) before intra-articular injections and after an interval of 10th day and 2nd month. In Group I - The mean pain score was measured as 7 before intra-articular injection of PRP while at 10th day the mean score was 3 and the 2nd month mean score was 1. In Group II - The mean pain score before intra-articular injection of triamcinolone acetonide was 6.5 while at 10th day the mean score was 6 and at 2nd month it was 4.5. The difference between pre-injection mean score and 2nd month mean score was more in Group I as compared to Group II and the difference was statistically significant (<0.001).

The maximal inter-incisal mouth opening was measured before injection and the mean MIO was 25mm in Group I and 27mm in Group II whereas at 10th day following intra-articular injection the mean MIO in Group I was 32mm and 31mm in Group II. After an interval of 2 months the mean MIO was measured as 39mm in Group I and 37mm in Group II. The MIO was increased in both the groups after a 2 month interval however the improvement in mouth opening was more in Group I as compared to Group II. The p value was <0.001 which reveals that the difference was statistically significant.

Joint noise was reported in all the patients before injection, 8 patients of Group I and 7 patients of Group II had joint noise whereas after 10 days following injection 5 patients of Group I and 6 patients of Group II had joint noise. 2nd month following injection 3 patients of Group I and 5 patients of Group II had joint noise. Joint noises decreased in greater no of patients in Group I as compared to Group II however the difference was not statistically significant.

Table 1.1

S.no	Variables	Groups	Pre-injections Values(Mean)	10 th day follow-up(Mean)	2 nd month followup(Mean)	T value	P value
1.	Joint Pain(VAS)	Group I	7	3	1	3.21	<0.01
		Group II	6.5	6	4.5		
2.	MIO	Group I	26mm	32mm	39mm	5.53	<0.01
		Group II	29mm	31mm	37mm		
3.	Joint noise	Group I	Present in 7 out of 8	Present in 5 out of 7	Present in 3 out of 7	6.01	0.03
		Group II	Present in all(8)	Present in 6 out of 8	Present in 5 out of 8		

DISCUSSION

The temporomandibular joint connects the mandible (lower jaw) to the part of the skull known as the temporal bone. The joint allows the lower jaw to move in all directions so that the teeth can bite off and chew food efficiently.⁸

Temporomandibular joint (TMJ) syndrome occurs when the joint, muscles and ligaments involved do not work together properly, resulting in pain. Temporomandibular joint syndrome and TMD or TemporoMandibular Disorders have been demonstrated to be caused by ligament weakness in many patients, often as a result of clenching the jaw or grinding the teeth, sleeping position or a forward-positioned mandible (lower jaw).

Malocclusion, or a poor bite, places stress on the muscles and may also lead to temporomandibular joint syndrome, as may an injury to the head, jaw, or neck that causes displacement of the joint. If left untreated, jaw osteoarthritis can result.⁹ TMDs can be subdivided into muscular and articular categories. Differentiation between the two is sometimes difficult because muscle disorders may mimic articular disorders, and they may coexist.⁴ TMD usually involves structural alteration of cartilage and subchondral bone due to the response of collagen, extracellular matrix, macromolecules, and proteoglycans. Anterior disc displacement with reduction refers to an unnatural forward movement of the disc during opening, which reduces on closing whereas anterior disc displacement without reduction refers to an unnatural forward movement of the disc during opening, which does not reduce on closing.⁵

Symptoms commonly associated with TMD include pain at the TMJ, generalized orofacial pain, chronic headaches and ear aches, jaw dysfunction including hyper- and hypo-mobility and limited movement or locking of the jaw, painful clicking or popping sounds with opening or closing of the mouth, and difficulty chewing or speaking.^{6,7,9}

Various treatment modalities have been considered for TMD's ranging from conservative treatment including counselling, exercises, occlusal splint therapy, massage, manual therapy and others as the first line treatment to surgical techniques including arthrocentesis, disc repositioning, disectomy, codylectomy etc.

In the present study, we compared intra-articular injection of platelet rich plasma with triamcinolone acetonide injection in patients with disc displacement with reduction.

Triamcinolone is a potent anti-inflammatory steroid classified as synthetic glucocorticoid. It decreases tissue inflammation response by blocking phospholipase A2 in the cell membrane, causing disruption of the activity of Cyclo-oxygenase and Lipo-oxygenase. This action results in the vasodilation and reduction of vascular permeability. Triamcinolone is also a potent immune suppressant which reduces the proliferation of T lymphocytes,

monocytes, eosinophils and decreases the binding of immunoglobulins with its receptors¹⁰. The most common local complications of intra-articular steroid injection include tears of tendons, soft tissue atrophy, skin atrophy and depigmentation and extravasation in the extra-articular space.¹¹ Corticosteroid injections can cause temporary increases in pain, septic arthritis and deleterious effects on the intra-articular cartilage. Small doses of triamcinolone 10mg are more effective than high doses such as methylprednisolone 40 mg.¹² PRP is a concentrate of platelets and associated growth factors (GFs) obtained from a patient's blood.¹³ PRP has been clinically used for various applications, including periodontal, oral surgery, maxillofacial surgery, esthetic plastic surgery, spinal fusion, heart by-pass surgery, and treatment of soft-tissue ulcers.¹⁴⁻¹⁹ The application of PRP amplifies the surge of chemical mediators to the microenvironment of the joint area, including platelet alpha granule-derived factors.^{22,23} The increased concentration of platelets and GFs simulates the initial stage of the inflammatory response, characterized by the migration of neutrophils, monocytes, and macrophages to the site of injury.²³ Mediators and cytokines mediate the initiation of neovascularization, fibroblast proliferation, and further recruitment of inflammatory cells. In addition to the stimulatory effects on reparative cells, local PRP application may also have an inhibitory effect on specific pro-inflammatory cytokines that may be detrimental to the early stages of healing, specifically through suppression of interleukin-1 release from activated macrophages.²² PRP increases chondrocyte proliferation and the production of matrix molecules and helped to maintain the integrity of the chondral surface and thereby facilitating joint movement.²⁴ The analgesic effect of PRP has been highlighted in the literature which showed the augmentation of cannabinoid receptors CB1 and CB2, which might relate to the analgesic effects of PRP.²⁵

In the present study, significantly good results were obtained with intra-articular injections of PRP as compared to triamcinolone acetonide injections which was in accordance with the study of Gupta S et al 2018. Out of the three parameters, two parameters including joint pain and maximal inter-incisal opening were significantly improved in Group I patients receiving intra-articular PRP injection whereas the third parameter joint noise was also improved in both groups without statistically significant difference.

CONCLUSION

The present study compared the efficacy of intra-articular PRP injection with triamcinolone acetonide with local anesthetic injection in patients with TMD's. Both the treatment modalities reduced pain in patients, improved their mouth-opening and reduced joint noise, however results obtained with PRP injection were comparatively better than those with triamcinolone acetonide injection.

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