

Role Of Platelet Rich Plasma (PRP) And Intra-Articular Corticosteroid (IACS) In Patients With TMJ Osteoarthritis: A Review Of Literature.

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Abstract:

Background: Temporomandibular joint (TMJ) is a compound joint also called as synovial joint, including temporal bone, movable mandible, numerous musculatures, articular disc and ligaments. There are various low grade inflammatory joint diseases which include osteoarthritis (TMJ-OA) and high grade joint inflammatory diseases which include arthritis (RA- Rheumatoid Arthritis). Diagnosing any of abovementioned is mandatory so that a proper treatment can be given to patients and thus the good prognosis. There are various method of diagnosing TMJ osteoarthritis but the best is Cone Beam Computed Tomography (CBCT). The treatment of TMDs is controversial, which has been divided into three categories- non surgical, minimal invasive and surgical. Thus in the present review, the role of PRP and Intra-articular steroids as a novel therapeutic agent has been discussed.

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I. Introduction

Temporomandibular joint (TMJ) is a compound joint also called as synovial joint, including temporal bone, movable mandible, numerous musculatures, articular disc and ligaments. Temporomandibular joint disorders are progressive painful conditions and can manifest as limited range of mandibular motion, deviation or deflection upon opening and closing, pre-auricular tenderness, clicking or crepitus¹.

There are various low grade inflammatory joint diseases which include osteoarthritis (TMJ-OA) and high grade joint inflammatory diseases which include arthritis (RA- Rheumatoid Arthritis). Temporomandibular joint osteoarthritis results from wear and degenerative changes in synovium, cartilage, capsules, tendons, articular surface of condyles that is accompanied by remodeling of underlying subchondral bone. In addition, flattening, erosions, generalized sclerosis, osteophytes and subchondral cysts or pseudocysts on surface of condylar head are often detected by cone beam computed tomography (CBCT) which is most sensitive and specific for diagnosis of TMJ-OA. However, others radiographic views such as orthopantomogram and TMJ – open and close can also be done for TMJ-OA but with less sensitivity and specificity².

The TMJ-OA can be caused by micro or macro trauma to the TMJ or by other pathological processes. These factors lead to bleeding in joint, effusion and decrease in lubrication. According to data, TMDs are most common affects 20- 40 years of age group³.

TMDs were classified in 1992 as research diagnostic criteria (RDC/TMD), which is broadly classified in three groups⁴:

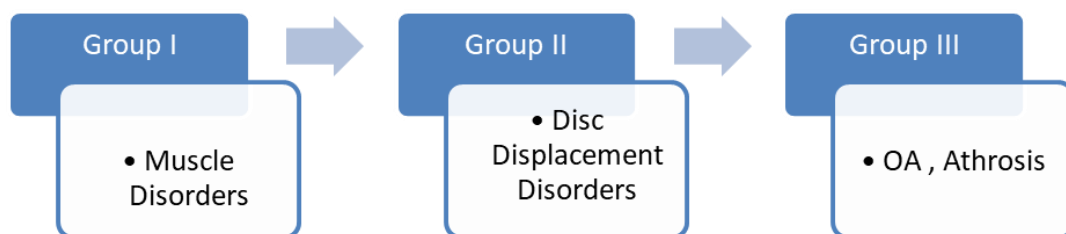


Fig 1: To show different groups of TMDs

The treatment of TMDs is controversial, which has been divided into three categories- non surgical, minimal invasive and surgical. If patient does not show any improvement with conservative treatment such as counseling, isometric exercises, NSAIDs, orthotics, arthrocentesis then a good option will be intra-articular injections to the TMJ⁵.

PRP has been shown to exhibit anti-inflammatory, analgesic, and antibacterial properties. PRP also restores intra-articular HA, increases glycosaminoglycan chondrocyte synthesis, balances joint angiogenesis, and provides a scaffold for stem cell migration. The clinical benefit of PRP has also been shown to be maintained 1 year after intra-articular injection in patients experiencing knee pain. Transforming growth factor (TGF)- β is present in PRP and has been associated with chondrogenesis during cartilage repair⁶⁻⁸. There are various methods of PRP preparations – PRP or Double spin method, Buffy coat method⁹⁻¹⁰. The normal circulating concentration of platelet ranges from 15,000-3,50,000 platelet/micro liter. When platelet concentration is 1-4 times than the baseline then it is supposed to be effective in tissue regeneration if 6-11 times higher than baseline values showed inhibitory effect on bone regeneration¹¹⁻¹². Systemically administered corticosteroids (CSs) result in a myriad of effects on cellular and humoral immune systems with profound anti-inflammatory and immunosuppressive responses. When injected locally, it shows a potent anti-inflammatory effect on synovial tissue and helps to reduce effusion, decrease pain with subsequent increase in range of motion of joint. Intra-articular CS injection. The recommended dose of IACs is Single injection per week for one month¹³. However, the exact mechanism of action of CSs on joint synovium is not clearly delineated in existing literature.

Madhumita Batabyal et al⁵ in 2023 did a study titled- A Comparative Study between the Effects of Intra-Articular Injections of Platelet-Rich Plasma versus Corticosteroid with Local Anaesthetic in Refractory Cases of Temporomandibular Joint Disorders. In this study, he concluded the study as Intra-articular PRP injection has significantly better outcome in terms of pain, inter-incisal mouth opening, and joint sound in refractory cases of TMD than intra-articular corticosteroid injection.

Edison S. Machado et al¹⁰ in 2022 introduced a simple double-spin closed method for preparing platelet-rich plasma. They concluded that double spin prepared better PRP than other conventional methods.

Wael Abbadi, Zafin Kara Beit, Nuraldeen M. Al-Khanati³ in 2022 conducted a study titled Arthrocentesis, Injectable Platelet-Rich Plasma. They concluded the study that a combination of TMJ arthrocentesis and PRP intra-articular injections showed the best outcomes regarding pain symptoms. None of the tested treatment protocols showed improvement in terms of articular sounds.

Umer Hussain et al⁷ in 2021 analyzed Platelet rich plasma injection in the management of temporomandibular joint dysfunction. It has been concluded that application of platelet rich plasma can be significantly effective in reducing pain while improving mouth opening and resolving the symptoms of TMJ dysfunction.

Jaskaran Singh and Bhanu Bhardwaj¹³ in 2020 did a research titled Treatment of Temporomandibular Joint Arthritis with Triamcinolone Acetonide and Hyaluronic Acid Injection: An Observational Study. They concluded that recommend the use of Triamcinolone acetonide and hyaluronic acid injection in TMJ arthritis as it helps in relieving pain and clicking of sound in majority of the patients.

Akash Rajput et al¹ in 2020 did a study titled A Comparative Analysis of Intra-articular Injection of Platelet Rich Plasma and Arthrocentesis in Temporomandibular Joint Disorders. The conclusion of study was that on comparison, both groups were found to have effective treatment modality.

Shang-Lun Lin et al² in 2018 did an observational study titled effect of arthrocentesis plus platelet-rich plasma and platelet-rich plasma alone in the treatment of temporomandibular joint osteoarthritis. A retrospective matched cohort study (A STROBE-compliant article). Based on the results from this study, it is recommended a single injection with 2 mL of high-concentration and high-purity PRP for TMJ-OA treatment.

Drew A. Lansdown and Lisa A. Fortier¹¹ in 2017 did a review titled Platelet-Rich Plasma: Formulations, Preparations, Constituents, and Their Effects. The purpose of this article is to describe the factors that determine the effects of PRP.

Elham F Hassan, Tarek M Ali and Nevein S Abdulla⁸ in 2016 conducted a study titled the clinical efficiency of platelet rich plasma in the treatment of temporomandibular joint disorders. The results showed PRP group had superior result than arthrocentesis group regarding pain and tenderness, and inferior result in clicking. They concluded that PRP injection is a safe and effective method in the treatment of TMDs.

Rachita Dhurat and MS Sukesh⁹ in 2016 did a review on Principles and Methods of Preparation of Platelet-Rich Plasma: A Review and Author's Perspective. In this article, they reviewed the principles and preparation methods of PRP such as double spin and buffy coat based on available literature and place our perspective in standardizing a safe, simple protocol that can be followed to obtain an optimal consistent platelet yield.

Ayman F. Hegab et al⁶ in 2015 did a study titled Platelet-Rich Plasma Injection as an Effective Treatment for Temporomandibular Joint Osteoarthritis. They concluded that PRP performed better than HA

acid in the treatment of TMJ-OA during long-term follow-up in terms of pain reduction and increased interincisal distance.

Luca Guarda-Nardini et al¹⁴ did a review in 2008 titled Arthrocentesis of the temporomandibular joint: a proposal for a single-needle technique. The adoption of a single-needle for both fluid injection and aspiration might have some advantages with respect to the traditional 2-needle approach in terms of time of execution, tolerability, and retention of medication.

Dworkin SF and LeResche L⁴ in 1992 gave The Research Diagnostic Criteria (RDC/TMD) to categorise TMD criteria into 3 groups according to the common factors among conditions.

Stanford School of Medicine – Stanford University Medical Centre, Department Of Radiology Gave information and instruction for patients using PRP which include background of PRP, Potential benefits of PRP, Pre-procedure planning and what to expect during procedure, and post procedure precautions.

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