

National Medical Institute
of the Ministry of the Interior and Administration

Maciej Chęciński

Treatment of temporomandibular joint disorders
by intra-articular administration
of hyaluronic acid and platelet-rich plasma preparations

Doctoral Dissertation

Supervisor: Assoc. Prof. Maciej Sikora, MD, PhD, Professor at the National Medical Institute of
the Ministry of the Interior and Administration, Affiliated Professor at Pomeranian Medical
University

Warsaw, 2025

Summary

Introduction: Temporomandibular disorders (TMD) affect up to 34% of the population, making them one of the leading causes of facial pain. Temporomandibular disorders (TMDs) include dysfunctions of the temporomandibular joints (TMJs). Diagnosing these conditions requires a detailed medical history, physical examination, and imaging studies such as computed tomography or magnetic resonance imaging, often necessitating interdisciplinary collaboration. Treating TMJ disorders with intra-articular injections is minimally invasive while providing long-lasting clinical effects. The primary objectives of this approach are pain reduction, improved jaw mobility, and suppression of inflammation. Therapeutic agents used for this purpose include hyaluronic acid (HA) and platelet-rich plasma (PRP). HA enhances the biomechanical properties of the joint and supports its lubricating function, while PRP stimulates cartilage regeneration and collagen biosynthesis.

Objective: The objective of this study was to evaluate the rationale for intra-articular treatment of TMDs using HA and PRP by analyzing their effectiveness in improving jaw mobility and reducing joint pain, as well as comparing the available scientific evidence supporting their use against other intra-articular therapies.

Methods: From 2018 to 2024, clinical trials and systematic reviews with meta-analyses were conducted to evaluate the effectiveness of HA and PRP in the treatment of TMJ disorders, employing various data analysis techniques, including statistical evaluation, systematic synthesis, and comparative assessments. The findings were published as a thematic series of seven scientific articles (A1–A7) in peer-reviewed international journals.

Results: The clinical trial (A1) demonstrated that intra-articular injections of HA, without prior joint rinsing, significantly improved jaw mobility, particularly in terms of mouth opening (+4.5 mm) and protrusion (+1.8 mm), with 88% of patients reporting relief from joint pain. The meta-analysis (A2) of studies on intra-articular HA injections without prior joint lavage confirmed that this therapy significantly increases mouth opening (+6.2 mm) and jaw protrusion (+2.0 mm) within the first month of treatment, while also reducing joint pain by an average of 59%, with effects that persist for up to 12 months following treatment. The systematic review (A3) identified a wide range of alternative injectable substances to HA, including corticosteroids, blood-derived products (PRGF, PRP, I-PRF), nonsteroidal anti-inflammatory drugs, opioids, irritants (e.g., dextrose), and stem cell-based preparations, which have been insufficiently studied for this indication so far. The clinical trial (A4) assessed the efficacy of five PRP injections without prior joint lavage, showing a reduction in joint pain (–2 points on a 0–10 scale) and modest improvement in jaw mobility, with a maximum mouth opening

increase of +1.6 mm, which was not statistically significant ($p = 0.32$). The first mapping review (A5) on therapeutic TMJ injections identified, among others, 73 publications on HA, 44 on PRP, and 26 on corticosteroids, analyzing the number of studies at various levels of evidence. The results highlighted the growing popularity of blood-derived products, which surpassed HA in publication volume in 2022. In the course of a literature review (A6) it was observed that adverse effects associated with HA and PRP injections into the TMJ are rare and pose no life-threatening risks to patients. The clinical trial (A7) compared the effectiveness of intra-articular HA (control group) and PRP (test group) injections for TMJ disorders, showing significantly greater increases in mouth opening (+4.6 mm vs. +0.5 mm) and jaw protrusion (+1.7 mm vs. +0.8 mm) in the group treated with HA, as compared to the PRP-receiving group.

Conclusions: Intra-articular HA injections without prior joint lavage effectively reduce pain and improve jaw mobility in patients with TMJ disorders, as confirmed by a study employing a five-injection protocol. PRP reduces pain and increases the range of pain-free mouth opening in TMD patients, but does not directly affect maximum jaw mobility. HA and PRP are the most extensively studied substances in the intra-articular treatment of TMDs, with publications on blood-derived products surpassing those on HA since 2022.

Maarej Chawicci