

Bilateral platelet rich plasma injections with assisted techniques for temporomandibular joint disorders

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ABSTRACT

Objectives. Temporomandibular joint (TMJ) disorders are frequently encountered in the population. Pain is the most common complaint. TMJ luxation needs surgical treatment which has many risks. The objective of this study was to treat TMJ disorders with a minimal invasive method, platelet rich plasma (PRP) injection, instead of surgery. **Methods.** The study included 7 female patients aged 15 to 42 years. Three ml (2 ml into the joint capsule and 1 ml into the pericapsular region) injections were applied in both sides. Two sessions of injections were planned. Three months after the last injection, a questionnaire was carried out. **Results.** Six of the subjects underwent two injections, and one of them underwent only one injection. Verbal analogue scale score was 7.66 ± 1.3 before the injections, 5.33 ± 2 after the first injection, and 3.33 ± 1.2 after the second injection. Pain decreased significantly after the first and more significantly after the second injection ($p=0.017$ and $p<0.001$, respectively). The mean total satisfaction rate was two at the first step ($p>0.05$) and four at the second step ($p=0.017$). **Conclusions.** Findings of our study indicate that PRP may be a useful technique for treatment of TMJ subluxations. The significant reduction in pain after either one or two injections suggests that it might be reasonable to investigate the efficacy and safety of this technique in larger study populations.

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Keywords: Platelet rich plasma, temporomandibular joint dislocation, temporomandibular joint pain

Introduction

Temporomandibular joint (TMJ) disorders like dislocation, pain, clicking, and inner ear pain are common in the general population. TMJ dislocation is defined as the movement of condyle out of the fossa and the advancement of the posterior surface of the condyle in front of the articular eminence. If this condition becomes chronic, surgical treatment is the only option. The goal of surgical treatment is to reposition the condyle and prevent further recurrences [1]. A new approach is different from surgery and is assisted with platelet rich plasma (PRP). Recent data

indicate that PRP injection into the ligaments supports connective tissue [2,3]. TMJ surgery is complicated and also has many risks. In this regard new and more minimally invasive treatment modalities would prove beneficial. In TMJ disorders, recurrent PRP applications may have positive regenerative effects, and may be coupled with conservative modalities like night splinting, anti-inflammatory drugs, and immobilization. We wanted to evaluate the effect of PRP injections into the TMJ on pain and patient satisfaction.

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Methods

This retrospective study included of 7 female patients aged 15 to 42 years, who were admitted to the plastic surgery outpatient clinic between July 2013 and August 2014 due to TMJ disorders. For acute conditions and first time occurring disorders, muscle relaxant, and anti-inflammatory medical therapy with night occlusal splint was started. Patients were queried for their complaints after one month follow-up time, and patients without a satisfactory response were recommended PRP treatment. PRP injection was applied twice in 6 patients and once in 1 patient who partially benefited from the injection and did refuse

the second injection. Minimum period between injections was one month.

PRP injection

50 ml of blood was drawn from the patients, and 6 ml of PRP was obtained using the Harvest's kit (Harvest Technologies Corporation, Munich, Germany) and advanced centrifuge technology (20 minutes at 200xg, Figure 1). Under sedative anaesthesia, three ml injections (2 ml into the joint capsule and 1 ml into the pericapsular region) were applied to both sides [4] (Figure 2). After PRP injection, patients' jaws were immobilized with an elastic bandage for three days during which just liquid

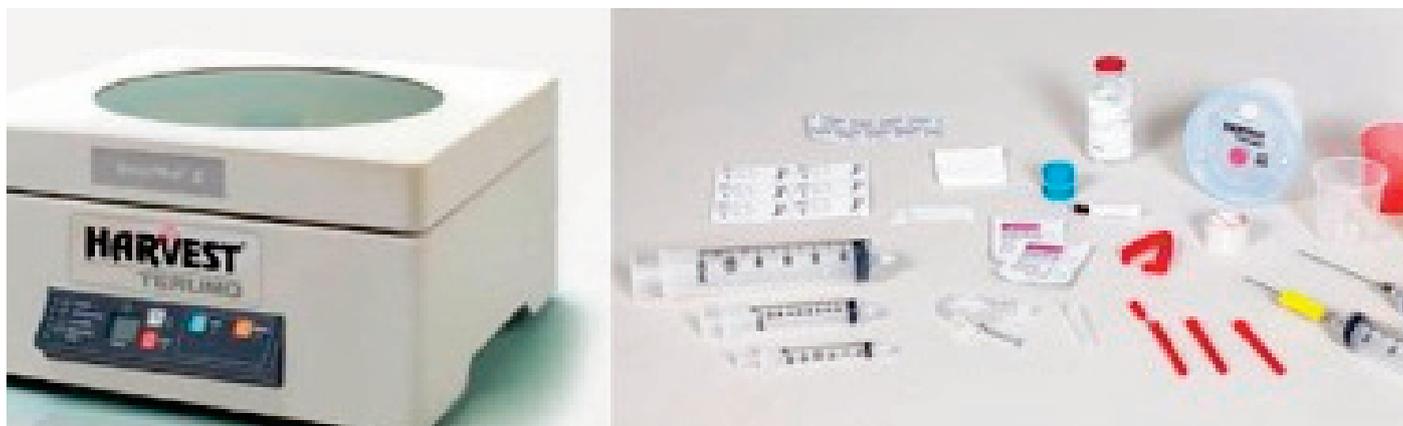


Figure 1. Harvest's kit and advanced centrifuge technology

diet was allowed. All patients were advised to restrict their joint movements and eat soft foods for one month.

Three months after the last injection, patients were asked to complete a questionnaire. The pain was assessed with verbal analogue scale (VAS) score, and using a 1 to 5 scale, satisfaction was determined in regard to clicking and dislocation before the injections and after the first and second injections. Maximal mouth opening (MMO) was estimated regarding millimetre before and after injections.

Statistical analysis

Normality of data distribution was assessed using Shapiro-Wilk test. Data with a normal distribution were expressed as mean \pm standard deviations while data with skewed distribution were expressed as median (minimum-maximum). Comparison of data was performed using Paired t-test or Wilcoxon test according to the distribution of the data.

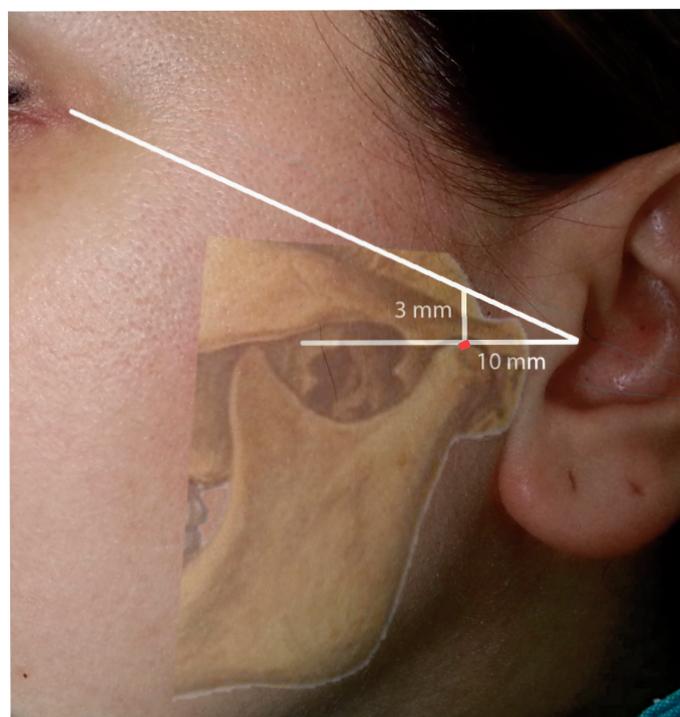


Figure 2. Anatomical landmarks for needle entry into the temporomandibular joint.

Results

Mean age was calculated as 23.14±9.3. The median time between the two injections was 38.5 days. Ages, VAS scores, and total satisfactions scores are listed in Table 1. Mean MMO was calculated as 45.14±4.7 mm before and 44.14±6 mm after two injections. Mean pain score was 7.66±1.3 before the injections, 5.33±2 after the first injection, and 3.33±1.2 after the second injection. Pain resolved significantly after the first and more significantly after the second injection ($p=0.017$ and $p<0.001$, respectively). There was also a significant improvement after the second injection compared to the pain score after the first injection ($p=0.021$).

The clicking was improved in one patient after the first injection was done. It was enhanced in another four patients after the second injection was done. Luxation developed in 2 patients after the first injection and in another four patients after the second injection. The difference was significant only after the second injection compared with the beginning ($p=0.03$). The total satisfaction rate was 2 (1-3) after the first injection ($p>0.05$) and 4±0.8 after the second injection ($p=0.017$). None of the subjects experienced significant complications associated with the procedure.

Discussion

The results of our study indicate that PRP injection may be a reasonable minimally invasive option in subjects unresponsive to conservative measures. We

observed a significant improvement in pain after both one and two injections and great satisfaction after two injections. There were no significant complications associated with the procedure.

Temporal and facial region pain is the most common complaint in TMJ disorders. Some patients also have TMJ luxation history, at least, one time. Common therapy for recurrent luxation is TMJ blockage with autologous grafts or biomaterials. However, those surgery methods have many risks like facial paralysis, foreign body reaction, hematoma, and abscess formation. Thus, novel minimally invasive treatment options are needed.

Platelet-rich plasma injection for strengthening the TMJ connective tissue is a rarely performed therapy but has positive results in bone, cartilage, ligament, and muscle tissue [5-10]. The popularity of this novel treatment method triggered an increase in studies. However, differences in application techniques, application regions, and PRP compositions make comparisons of efficacy results difficult. Potential complications following the procedures are mild; therefore, this method of treatment appears to be safer in comparison with surgical techniques [4]. PRP injection applied by orthopaedic surgeons and sport medicine physicians to the knee, ankle, and elbow joints [11, 12]. New studies suggest that PRP injection might be beneficial for TMJ ligament and cartilage healing [4].

In 1973, Schulz [13] was the first to report successful results using autologous blood injection (ABI) to treat chronic TMJ dislocation in ten patients. Daif [14] showed that injecting ABI into the superior joint space and pericapsular tissues was more

Table 1. Baseline and follow-up study variables

Patient No/Age	VAS Scores			Total Satisfaction Scores	
	Before	1 st injection	2 nd injection	1 st injection	2 nd injection
1/15	9	8	5	2	3
2/19	8	5	3	3	5
3/18	9	6	2	2	4
4/20	8	7	4	2	4
5/42	6	3	2	3	4
6/29	8	3	3	2	3
7/24	6	5	4	1	5

VAS= verbal analogue scale

successful compared to an injection into the superior joint space only (80 vs. 60%). Similarly, Machon *et al.* [15] reported an 80% success rate with ABI into the superior joint space and pericapsular tissue in 25 patients suffering from chronic recurrent TMJ dislocation.

Reduction in pain and clicking with PRP injection was showed in this study similar to Pihut's results [4]. Also, improvement in luxation was similar to the results of Candirli *et al.* [3]. To our knowledge, all previous studies used single injections for TMJ disorders. However, in this study, most of the patients underwent two injections. Our results show that after the second application, more significant pain reduction and patient satisfaction were observed.

Injection of PRP has the advantages of being repeatable, averting from tissue dissection, and less post-procedure complications [16]. The uncertain nature of the effect mechanism of the procedure is the primary disadvantage of the PRP technique [17]. Since the histopathological effects of PRP remain unclear, the fibrosis occurring after the procedure may not provide sufficient resistance to avoid dislocation in a frequently dislocated joints. Possible mechanisms underlying the effect of PRP injection on joint pain and function include platelets contain growth factors like platelet-derived growth factor, transforming growth factor beta, the vascular endothelial growth factor that is responsible for stimulating tissue generation and repair [18].

Our study has some limitations including the limited sample size and nonrandomized and open nature.

The results of our study indicate that PRP is practical and minimally invasive treatment of TMJ subluxations with favourable pain and satisfaction outcomes. The reduction in pain after recurrent applications suggests that it may be reasonable to investigate the efficacy and safety of this technique in prospective controlled trials with larger study populations.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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