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Cytorich platelet-rich plasma in cervical neck facet joint arthritis: A case report

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Abstract

Introduction: Facet Joint Osteoarthritis (FJOA) is the most common facet joint pathology with pronounced burdens. Plasma Rich Protein (PRP) injections have been previously investigated in lumbar FJOA with positive results, but use in Cervical Spine (C-Spine) FJOA remains under-investigated. We report the case experience of a patient who was injected with Cytorich PRP for treatment of C-Spine FJOA.

Case presentation: A 52-year-old male patient with a history significant for C5-C6-C7 fusion, C4-C5 right paracentral disc herniation and pain in the right mid-thoracic back was diagnosed with C-Spine FJOA using imaging. Other therapies (e.g., stem cell, hyrounic acid, traditional PRP) failed to alleviate his pain.

Methods: Cytorich PRP was injected bilaterally into the C4-C6 facet joints under fluoroscopy. Cytorich PRP was also injected into trapezius and rhomboids using similar preparation and methods. The Visual Analogue Scale (VAS) was used to assess changes in pain outcome.

Results: The patient reported a VAS score transformation from 9/10 (severe pain) at baseline to 1/10 (barely any pain) at six and twelve-weeks post-injection.

Discussion: This patient experienced almost complete alleviation of pain at six- and twelve-weeks post-injection when other treatments had previously failed, suggesting cytorich PRP may be a novel safe and effective technique for clinical use in patients with C-Spine FJOA. Investigation using long-term prospective or retrospective cohorts or other observational methods on multiple patients should be considered as next steps.

Keywords: Platelet-rich plasma, Facet joint osteoarthritis, Interventional pain, Orthobiologics.
Abbreviations: FJOA: Facet Joint Osteoarthritis; OA: Osteoarthritis; PRP: Platelet-Rich Plasma; VAS: Visual Analogue Scale; MRI: Magnetic Resonance Imaging

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Introduction

Facet Joint Osteoarthritis (FJOA) is the most common pathology affecting the facet joint and is associated with pronounced financial, physical, and psychological burdens [1-3]. FJOA is characterized by degeneration of the "three-joint complex" consisting of an intervertebral disc and bilateral posterior facet joints [1]. Most FJOA affects the lumbar spine, but FJOA can also affect the thoracic and cervical spine [2,4,5]. Despite this, neck FJOA remains misunderstood, underdiagnosed, and undertreated, leaving a lot of patients with unnecessary pain.

C-Spine FJOA is widely prevalent in adults, with historical studies finding a prevalence of 19% among adults aged 45-64 years and 57% among those 65 years and older in a US-based study; these estimates likely underestimate the true prevalence of C-Spine FJOA given the intensity of radiography used and time period when the study was conducted [2,5]. Greater age and higher BMI have been associated with higher cervical FJOA risk [2,6].

Diagnosis of FJOA can be made through a combination of clinical presentation and imaging. Symptoms included regional pain with pseudo-radicular radiation that is variable in distribution pattern [7]. Imaging investigations include x-rays, computed tomography, or Magnetic Resonance Imaging (MRI). On X-ray, findings are similar

to Osteoarthritis (OAs) in other joints, as described by Pathria *et al*. [8]. On MRI, findings can involve active synovial inflammation, edema of adjacent bone tissue and additional degenerative tissue changes [1,7-10].

Multiple treatment modalities have been tried for FJOA. First-line therapies are conservative and include medical (acetaminophen, nonsteroidal anti-inflammatory drugs, antidepressants) and non-medical (physiotherapy, acupuncture, psychotherapy) management [11]. Interventional management for FJOA have included blocks, steroid injections, radiofrequency ablation, hyaluronic acid injections, and Platelet-Rich Plasma (PRP) injections [1,11]. There has been increasing evidence of the efficacy of intra-articular injections like hyaluronic acid and PRP injections for Knee OA [1,12-14]. Additionally, PRP has been shown to be a superior long-term treatment to pain associated with lumbar FJOA than corticosteroid injections [3]. It is therefore reasonable to assume that PRP injections may produce similar effects for neck FJOA. Given that neck FJOA lacks a gold-standard method of treatment, it is especially important to find a treatment that helps relieve pain in patients with this condition.

There are several types of PRP that have previously been described in the literature [13]. Recently, Brokhman *et al*. [15] described a novel type of PRP which they termed "Cytorich PRP". Cytorich PRP is an autologous blood product which has provided positive *in vitro* results in targeting virus-induced cytokine storms [15]. This makes it a strong candidate for regulation of the anti-inflammatory processes that are responsible for most of the patients' symptoms of pain from OA [16].

Currently, we are not aware of any studies aimed at pain management of cervical neck facet joint OA. Therefore, this case report aims to shed light on an innovative treatment option for this understudied and underreported condition.

Case Presentation

A 52-year-old right hand dominant general veterinarian presented with a 3-year history of pain in the thoracic back, trapezius muscle, and cervical spine to the level of C2. He has stopped performing long procedures as he has found the pain to be intolerable with prolonged flexion. The pain has also significantly impacted his sleep and Activities of Daily Living (ADLs) such as walking, going up stairs, or exercising.

He was a non-smoker with no known comorbid conditions but treating his pain with ibuprofen or gabapentin PRN. He was also not on any scheduled medications (including blood thinners). His past medical history is significant for C5-C6-C7 fusion for a C4-C5 right paracentral disc herniation. His pain persisted and he opted for a combination of stem cell, hydrouronic acid and PRP injected into his lower cervical and thoracic spine in December 2019. He has not received any conservative treatments like physiotherapy but has received radiofrequency ablation treatment without improvement to the pain.

The patient reports that his pain is primarily in his right mid-thoracic back. He describes this sensation as a burning or stabbing pain. It is aggravated by forward flexion over prolonged periods of time but is alleviated with extension on a flat surface. The pain is occasionally accompanied by bilateral paresthesia in the first three digits at night, with a single episode of paresthesia extending through the elbow and the hand. He noticed occasional shaking of the right hand after prolonged neck flexion (reported as multiple hours). He reports no associated balance changes, fever, urinary urgency/retention, or drenching night sweats. He recalls no previous trauma to the thoracic or cervical spine.

On examination, gait is normal with no signs of antalgic gait. Inspection revealed no atrophy or deformity of the cervical or thoracic spine and no winging of the scapula. Active range of motion was normal through flexion, extension, and bilateral lateral flexion (50°). Sensation and reflexes were 2+ and symmetrical. Additional tests were performed to characterize the back pain: Negative Spurling's maneuver, negative Phalen test, and negative Tinel's sign at the cubital tunnel.

An MRI was performed in 2021 which confirmed the previous cervical spinal fusion and improvement in C4-C5 compression of the cord compared to imaging performed in 2016. However, additional multilevel degenerative changes were observed in the cervical and thoracic spine. A diagnosis of cervical facet joint osteoarthritis was made in accordance with the diagnostic criteria described by Perolat *et al*. [1].

Overall, these findings were consistent with degenerative changes of the thoracic spine and trigger point tightness in his right trapezius muscle. The patient requested Cytorich PRP injections to improve his regional pain and ability to maintain cervical/thoracic flexions for prolonged periods of time.

Materials and Methods

Informed consent was obtained from the patient for the procedures. They were then positioned prone on the table and the sites of injections were marked.

Cytorich PRP into C4-C6 facet joints

The sites were prepped with ChloraPrep and draped in a sterile fashion, followed by an injection of 2% lidocaine. The Cytorich PRP was prepared using the method described by Brokhman *et al*. [15] and administered into bilateral C4-C6 facet joints under fluoroscopy. A 1.5" 25G spinal needle was advanced each facet joint and 1.5 cc Cytorich PRP were safely injected into each facet joint. The procedure was then repeated for the contralateral site.

PRP injection into trapezius and rhomboids

The sites of greatest tenderness were prepped with alcohol using 25-gauge 1.5-inch needle, 2 cc of solution containing

PRP was injected into each muscle or ligament, using a fanning technique, and spreading the solution over a broad area.

The procedures were tolerated well.

Results

The outcome measures were: Visual Analog Scale (VAS) for pain (0-10, where 0 indicates no perceived pain and 10 indicating maximal perceived pain) [17].

We measured the outcomes before, six weeks and twelve weeks after the injections. The patient's reported 90% pain improvement six weeks' post-injections, going from a 9/10 on the VAS to a 1/10 at six and twelve weeks. The results are illustrated in Figure 1.

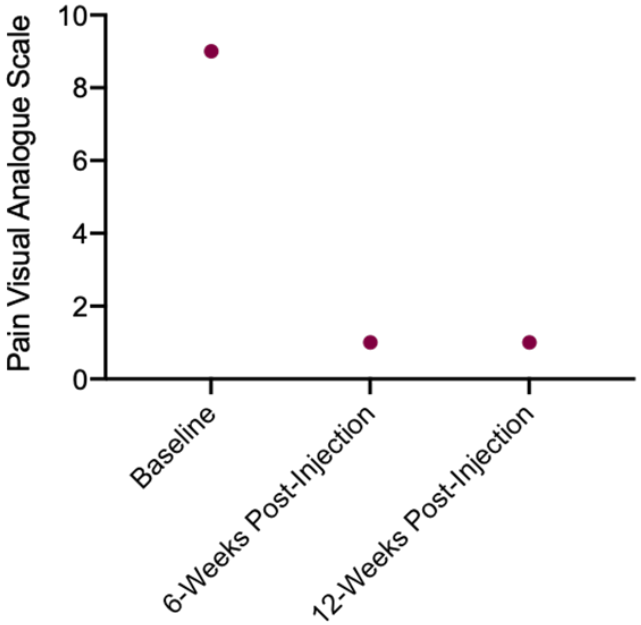

Figure 1. *VAS scores at baseline, 6 months and 12 months following Cytorich PRP for cervical FJOA.*

Discussion

Protein-rich plasma treatment has previously been shown to effectively improve pain-related outcomes in osteoarthritic patients, including knee OA and lumbar FJOA [3,12,18]. Similarly, the patient in this case study was found to have a significant improvement in pain at six- and twelve-weeks post-injection. While PRP has had positive results in treatment of other osteoarthritis, including other FJOA, this is the first case study, to our knowledge, to investigate its possible effects in cervical neck FJOA. This study also provides some evidence, specifically, that Cytorich PRP may be safe and effective in patients, as proposed by Brokhman *et al*. [15].

Facet-joint osteoarthritis, being often misunderstood and underdiagnosed, can potentially provide great physical, psychological and financial burden on patients [1,2]. Our results gratify the need for further research into novel potential treatments of this disease. Indeed, our case study relates to other research conducted in patients experience lumbar FJOA. For example, Kirchner *et al*. [19] found that among 86 patients in their retrospective review patient VAS scores dropped from an average 8.4 (SD: 1.1) pre-treatment to 4 (SD: 2.6), 1.7 (SD: 2.3) and 0.8 (SD: 1.7) at one, three and six months respectively. Similarly, other studies have also demonstrated >10% improvement in lumbar functional capacity *via* Roland-Morris Disability Questionnaire and Oswestry Disability Index [3]. One randomized trial found a significant improvement in VAS scores at rest and flexion among PRP patients at two, three, and six months compared to patients receiving only local anesthetic and corticosteroids [3,18].

Careful consideration should be taken when comparing relatable research conducted in lumbar FJOA to thoracic or cervical neck FJOA cases. While these diseases relate in their pathogenesis (*i.e.,* three-joint complex degeneration), diagnosis, and first-line treatment, nuances may exist in the way that PRP can be administered; for example, cervical injections may be deeper and more invasive than lumbar spine injections [20].

For these reasons, and given the current dearth in the literature, more research into the treatment of cervical neck and thoracic FJOA should be conducted. Next steps can include the investigation of PRP, including Cytorich PRP, in cervical neck and/or thoracic FJOA in multiple patients using prospective or retrospective cohorts.

Indeed, this study, while providing positive results in one patient, is limited in its evidence. First, these results reflect reality for a single patient, and need replication in a larger cohort to be better verified. Similarly, observational research is limited in that it cannot provide controls to extraneous factors that may affect outcomes, which may warrant an eventual trial in the future. Lastly, our results are limited in both number of outcomes and observations; future case reports in this area and observational studies alike should generally investigate multiple outcomes (including pain, quality of life, ADLs), include multiple patients (retrospective, prospective cohorts), and multiple time points (including observations past six months).

Conclusion

Facet-joint osteoarthritis can be a severely debilitating disease, causing multi-faceted suffering to patients. This case report provides positive evidence that Cytorich PRP effectively reduced pain in a single patient experiencing cervical FJOA.

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Conflict of Interest

No conflicting relationship exists for any author.

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