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Case Report Open Access

Ultrasound Guided Dextrose Prolotherapy and Platelet Rich Plasma Therapy in Chronic Low Back Pain: Three Case Reports

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Abstract

These three case reports describe a regenerative medicine approach for geriatric patients with chronic low back pain who previously failed conventional treatment options for osteoarthritis (OA) of the lumbo-sacral spine. The regenerative medicine-based treatment programs successfully integrated spine prolotherapy with platelet rich plasma injection therapy. Ultrasound guidance was used to identify sacroiliac joint/ligaments, facet capsule and epidural space (sacral hiatus). All procedures were performed safely in the outpatient office setting without adverse events.

Keywords: Osteoarthritis; Platelet rich plasma injection therapy; Prolotherapy; Spine

Introduction

For patients with osteoarthritis (OA) involving the spine, proper diagnosis, pain management and functional outcomes remain poor and inconsistent. This is despite widely used therapies such as steroid and Botulinum toxin injections, chemonucleolysis, radiofrequency denervation, intradiscal electrothermal therapy, pain management pumps, spinal cord stimulators, and surgery [1,2]. Most of these options also include adverse side effect profiles and significant complications risks.

Potential complications pose an even greater concern in the elderly. Recurrent glucocorticoid (GC) exposure is the most common etiology of drug-induced (secondary) osteoporosis. Moreover, *in vitro* studies of tendons and ligaments have exhibited a decline in cell proliferation and collagen synthesis when exposed to GCs, and their clinical efficacy has not been supported by the scientific literature [3]. Postoperative confusion, depression, irreversible dementia and prolonged hospitalization are recognized complications associated with surgery and anesthesia in the elderly [4]. Consequently, there is increasing interest in tissue regeneration and healing via injection of bioactive substances, such as concentrated dextrose and platelet rich plasma (PRP) into targeted structures. Growing evidence suggests regenerative injection therapies are a promising pain management option for chronic low back pain and OA and may also decrease the need for surgical interventions in a typically high-risk patient population [5-8]. To our knowledge, no randomized controlled trials involving treatment of osteoarthritis or articular cartilage pathology involving PRP exist, and it is not currently considered a primary treatment option.

Here we present three case reports demonstrating successful use of concentrated dextrose prolotherapy with PRP injections therapies to treat OA in the lumbo-sacral spine in elderly patients who previously failed conventional treatment methods. A curvilinear 4 MHz Ultrasound probe was used for all the cases and Hackett Method [9]. (Additional case details are provided in table 1).

Case 1

A 78 year-old female initially presented to the clinic with a six year history of lower back and lateral hip pain interfering with ambulation. Because she previously failed several conventional treatment modalities, she received ultrasound-guided regenerative injection therapy. The Hackett Method was used for the left gluteal tendon and spine. She received five injection sessions 4-8 weeks apart.

One month: Pain 0/10

Two months: Pain 1-2/10

Twelve months: Patient reported no use of pain medications, community ambulation without a cane and six to seven days per week of adequate pain relief. She indicated "extremely satisfied" on the post procedure pain inventory assessment.

Case 2

A 67 year-old female status post L4/5 and L5/S1 laminotomy presented with complaints of left sacroiliac (SI) pain for six months. She reported the pain as 5/10 with it impeding her ability to sit. She experienced zero days of adequate relief. Her prior treatment had consisted of low level laser therapy, massage, prolotherapy, epidurals, SI steroid injection, and an SI ablation.

The patient received a series of prolotherapy and PRP injection therapeutic applications of the left SI joint and overlying dorsal SI ligaments. She underwent three injection sessions approximately every four weeks. Functional outcome measures and goals included tolerable sitting.

Ultrasound guidance was used to identify the SI joint and overlying ligaments. Using sterile technique and prone positioning, 4 mL of PRP was delivered in 1mL increments to the SI joint and dorsal ligaments. The treatment area was pretreated with dextrose solution.

One month: Patient reported 50-60% decrease in pain and increased sitting ability.

Two months: Pain 3/10

Three months (including completion of three treatments): Pain 3-4/10 with improved sitting tolerance and 7 out of 7 days of adequate pain relief.

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	Case 1	Case 2	Case 3
Age	78	67	83
Gender	Female	Female	Male
Complaint	Low Back PainHip Pain Walks with a cane	Sacro-iliac (SI) Pain Impaired Sitting	Low Back Pain Hip Pain Feet Numbness Walks with a walker
Diagnosis(es)	Lumbar DDD/DJD* Gluteal Tendonosis	SI Arthritis/ligament dysfunction	Central Lumbar Stenosis Lumbar DDD/DJD* Lumbo-Sacral Ligament dysfunction
Prior Treatment	Physical Therapy Epidurals Chiropractic Naproxen Laminectomy Hip Labral Repair	Laminotomy SI Ablation Low Level Laser Massage Prolotherapy Epidurals SI Steroid Injection	Acupuncture Tramadol Hydrocodone+Acetaminophen Physical Therapy Gabapentin
Proliferant	12.5%-25% Dextrose PRP**	12.5%-25% Dextrose PRP**	12.5%-25% Dextrose PRP**
Treated Structures	Gluteal Tendons Lumbo-Sacral Ligaments	SI Joint SI Ligament	SI Ligament (Posterior) Lumbar Facet Capsules Lumbo-Sacral Ligaments
Initial Pain Score	8.0	5.0	7.0
Post Treatment Pain Score	1.5	3.5	2.0
Post Treatment Function	Ambulation without cane	Improved Sitting	Unassisted Community Walking

*Lumbar Degenerative Disc and Joint Disease
**Platelet Rich Plasma

Table 1: *Subject parameters.*

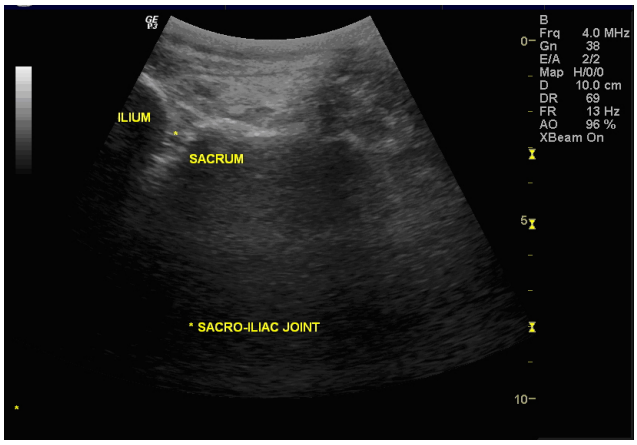

Figure 1: Representative ultrasound image of left sacroiliac joint obtained by use of a 4MHZ Curvilinear transducer.

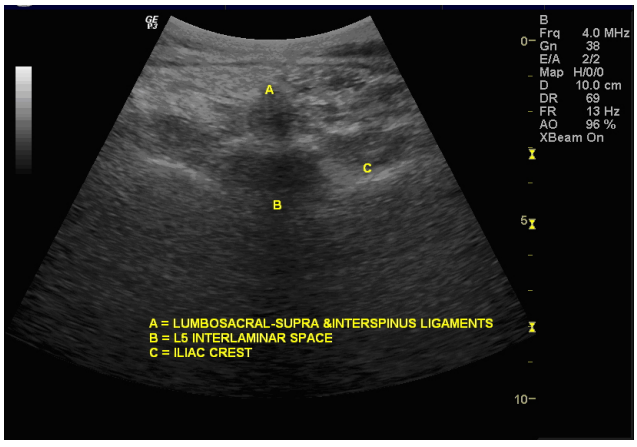

Figure 2: Representative ultrasound image of midline lumbar spine at the lumbo-sacral junction using a 4MHZ Curvilinear transducer.

Twelve months: Patient stated she was "satisfied" with the results and reported "goals as met".

Case 3

A 83 year-old male presented with complaints of low back pain radiating to both legs for a duration of five years. He reported zero days per week of pain relief, and his associated symptoms included numbness and tingling of both feet. His pain increased with lying flat in bed, walking, and maintaining an erect posture. He reported reduced walking over the past five years. Past treatments consisted of acupuncture, hydrocodone-acetominophen, and physical therapy. He had declined recommended surgery. His past medical history was significant for cardiac dysrhythmia, hypertension, and coronary artery disease. An ultrasound-guided caudal epidural relieved his leg symptoms, but he complained of persistent low back and hip pain. He continued to require his walker. Right hip X-ray was within normal limits.

An ultrasound-guided lumbosacral prolotherapy treatment with concentrated dextrose and PRP injection was initiated. He received six treatments 4-5 weeks apart.

One month (six weeks): Back pain 4/10; hip pain 0/10

Three months: Back pain 4/10; no longer using walker

Eleven months: Back pain 2/10; no longer using walker

Discussion

Over fifty years ago George Hackett, MD identified and mapped out ten lumbosacral ligament pain dermatomes. Subsequently, he developed a standardized prolotherapy injection technique. This technique was found to be effective in treating refractory pain related to ligament laxity and resulting joint pain [9]. Despite Hackett's success, prolotherapy is still not a first-line treatment option, particularly for chronic and refractory musculoskeletal disorders. More studies are needed to establish it as a safe and efficacious treatment modality compatible with widespread clinical use. The term "prolotherapy", synonymous with regenerative injection therapy, is a method of injection treatment designed to stimulate healing. Although various bioactive solutions are available, concentrated Dextrose and PRP were the choices selected for the patients presented in this series of case reports. Dextrose (initially recommended by Hackett) and autologous PRP have different mechanisms of action. It is postulated that dextrose

initiates healing by an osmotic effect. Autologous PRP, a more recent advancement to the field, facilitates tissue healing through the physiological platelet healing cascade. The alpha granules contained in platelets release a myriad of growth factors which promote tissue repair. Therefore, there are advantages to combining dextrose with PRP. With poor or delayed healing response as a concern in the elderly, the use of PRP may augment the beneficial effects of dextrose prolotherapy. All patients treated with PRP failed Hyperosmolar Dextrose Prolotherapy monotherapy. Secondly, the addition of dextrose to PRP allows the physician to treat a wider anatomical area, such as in the lumbosacral region. This makes PRP more cost-effective and affordable for patients.

These case reports demonstrate the successful use of a combined dextrose-PRP injection therapy utilizing Hackett's Method. With the addition of an ultrasound-guided approach to target lumbosacral structures, all procedures were successfuly performed safely and accurately in an office setting [10]. Although ultrasound has limited diagnostic value in the spine, it aids in identifying target structures (Figure 1) and landmarks (Figure 2). Commonly targeted structures include the Iliolumbar, Supraspinous and Interspinous Lumbosacral, Sacral and Sacroliliac Ligaments and Sacroiliac Joint. This approach diminishes costs and potential complications by negating the need for radiological and parenteral analgesia/anesthetic exposure. At one year follow-up, all subjects maintained pain reduction, decrease or elimination of oral analgesia use and improved function. Given the preliminary positive outcomes in these refractory and complex cases, the use of PRP with dextrose prolotherapy for lumbosacral ligaments warrants more vigorous investigations. These results suggest an exciting and effective method of managing OA of the spine, particularly in the high-risk or refractory chronic pain geriatric population.

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