

REMARKABLE RECOVERIES

The Use of Prolotherapy in the Treatment of Chronic Overuse Shoulder and Neck Pain, Neurogenic Pain and Hip Degeneration in an Incomplete C4-C5 Spinal Cord Injury Patient

Ross A. Hauser, MD & Kimberly A. Gruen, BA

ABSTRACT

Chronic pain, osteoporosis, and joint degeneration are common problems facing a spinal cord injury (SCI) patient. To date, there are no published case studies documenting the effectiveness of Prolotherapy in reducing pain and improving joint function in SCI patients. The following is a case study of the use of Prolotherapy to decrease neuropathic, overuse, and pain from joint degeneration as well as improve function in an incomplete C4-C5 quadriplegic.

Journal of Prolotherapy. 2009;3:166-171.

KEYWORDS: Prolotherapy, neurogenic pain, overuse injury, quadriplegic, spinal cord injury.

Spinal cord injuries currently affect approximately 450,000 people in the United States with an estimated 8,000 to 12,000 new injuries per year.^{1,2} About half of these injuries result in quadriplegia. One of the major complications associated with all spinal cord injuries is the treatment and management of chronic pain.³⁻⁶ It has been estimated that 40-100% of spinal cord injury (SCI) patients experience chronic pain after a SCI.⁷⁻⁹ Chronic pain greatly impacts the physical, and psychological well-being, as well as the quality of life of the SCI patient.^{10,11} The severity and persistence of pain associated with SCI are, however, of greater significance than its prevalence. It is not unusual for these patients to experience pain for decades because their longevity approaches normal life expectancy owed to early interventions and rehabilitative measures. Treatment of the chronic pain associated with spinal

cord injuries has been an ongoing process, and many clinicians are unsure of how to assess and care for this complication.¹²⁻¹⁵ Some commonly used treatments include occupational and physical therapy, exercise, medication, and surgical procedures.¹⁶⁻²⁰ Unfortunately, most treatments have proved to be relatively ineffective. The lack of effective treatment for SCI pain causes these patients great frustration and, in addition to long-term motor disability, they must endure intractable pain. For this reason, people with SCI and chronic pain are seeking alternative treatments. One of the treatments they are finding is Prolotherapy. Prolotherapy involves injections into injured ligaments, tendons and joints to stimulate repair. Prolotherapy is becoming a widespread form of pain management in both complementary and allopathic medicine.²¹⁻²⁴ It is being used in the treatment of spine and joint degenerative arthritis, as well as for pain management in many areas, such as meniscus tears, fibromyalgia, and a variety of sports injuries.^{25,26}

Another common complication for many SCI patients is osteoporosis and joint degeneration below the lesion level.²⁷ Immobilization secondary to SCI is associated with marked and rapid atrophy of bone. The elimination or decreased use of leg muscle activity causes the loss of calcium and phosphorus which leads to bone loss. The condition can be avoided or lessened if the patient is able to stand using a standing frame or other supportive device.²⁸ The use of a standing frame has many other beneficial effects, such as decreased pressure sores, increased overall strength, and an improved sense of well-being.

The following is a case report on the use of Prolotherapy in the treatment of a quadriplegic with an incomplete C4-C5 spinal cord injury. The goals of the Prolotherapy in this patient were to help eliminate shoulder, neck, and thoracic pain and to stabilize the patient's right hip so he could continue to stand with the aid of a person or a standing frame.

CASE REPORT

Michael Schwass is a 49 year-old Caucasian male who sustained an incomplete C4-C5 spinal cord injury while playing hockey in 1975 at the age of 16. (See Figure 1.) He underwent three surgeries following the injury, which included a cervical spinal fusion at C4-C7 using a bone graft. In 2002, Michael came to Caring Medical and Rehabilitation Services (Caring Medical) at the age of 43, with complaints of upper back, neck, and shoulder pain. His primary concern was his recent inability to stand due to a degenerated right hip as a result of osteoarthritis. He specifically lost the ability to make standing pivot transfers



Figure 1. Michael Schwass at the time this article was written.

because his left hip would give out during this movement. Though Michael was a quadriplegic, he prided himself on being able to stand independently without the use of leg braces for up to one minute. He was also able to stand independently for short periods of time with the aid of his standing frame. In late 2001, he lost the ability to stand independently at all and his physicians felt it was because of a collapsing degenerated right hip. (See Figure 2.) He also reported that it was becoming increasingly more difficult for him to sit in his wheelchair because he was losing range of motion of his hip. Sitting was getting unbearable because of the pain. His orthopedic surgeon told Michael that a total hip replacement was his only option. Michael noted that his orthopedist after seeing his X-rays commented "I don't know how you can stand the pain in there!" He and his surgeon discussed that he was at increased risk of wound infection and some other complications because of his spinal cord injury, and subsequently the spasticity in his legs that came with it. Looking for an alternative to total hip replacement, he sought out an evaluation for Prolotherapy.

Michael also wanted an opinion on his right shoulder and thoracic pain. He reported the shoulder pain as achy in quality and located at the front and top of his shoulder, which increased with driving. Michael reported that the thoracic pain was burning in quality and the severity of pain increased with sitting for prolonged periods. On the initial visual analogue scale (VAS) of 0 - 10, his neck pain rated a 7, shoulder an 8, and thoracic a 6.

On initial physical examination he was totally dependent on transfers. He had no movement at all in his legs. He had normal sensation in the face and neck and some in the shoulder region. Below these areas he had about 50% sensation in the torso and on the legs he was able to sense light touch about 20%. In regard his motor system, he had normal neck strength. He had some antigravity movement bilaterally in shoulder abduction and shoulder internal rotation. He could flex his elbows when gravity was eliminated. There was no movement of the hand or wrist. He had no active leg movement. He had tremendous spasticity in both legs. The hip exam was very difficult because of spasticity but hip flexion appeared to be 85 degrees, but internal and external rotation was impossible to assess due to spasticity. He had notable tenderness to palpitation in his posterior neck and upper back specifically along the trapezius and levator scapulae attachments. He also had tenderness at the acromioclavicular joint and at

the supraspinatus and subscapular tendon attachments in the right shoulder. Severe decrease of range of motion was observed in all planes of his neck. Extension was more affected than flexion. His thoracic exam was unremarkable, as sensation was decreased in this area. His X-rays showed hip dysplasia with flattening of the femoral head with superior migration and a loss of joint space, sclerosis, and large osteophytes bilateral with the right hip being worse than the left.

Treatment with dextrose Prolotherapy was recommended with the objective to decrease or eliminate thoracic, neck, shoulder, and hip pain and improve hip motion. An additional goal for the hip was to increase his ability to retain the erect position with the use of a standing frame for extended periods of time and regain the ability to do standing pivot transfers.

Prolotherapy was started on his hip in September 2002 using the Hackett-Hemwall technique of Prolotherapy. A 15% dextrose, 10% Sarapin, and 0.1% lidocaine solution was injected into and around the following structures: right hip, greater trochanter, and periarticular structures. (See Figure 3.) Eight cc of solution was injected into the joint and another 30 injections with 40cc of solution were used to complete the treatment.

Michael could stand independently for a few seconds by the fifth treatment, and by the fifteenth treatment felt much more stable with his right hip in regard to transfers and standing. He stated at that time that he was 60% of where he wanted to be. In 2006, after 25 treatments of dextrose Prolotherapy, Michael was able to stand completely on his own for almost one minute due to improvement in hip stability. By this time his hip flexion range of motion had improved to 100 degrees. He could now sit for extended periods of time without pain.

In the meantime, Michael began receiving Prolotherapy to his neck, shoulder, and thoracic region. For his neck pain, Prolotherapy was given to his facet joints and



Figure 2. Non-weight bearing AP right X-ray. This X-ray shows Michael's collapsing right hip.

transverse processes of C2-C7, as well as the superior and inferior nuchal ridge on the occiput. The supraspinatus and subscapularis tendon attachments, glenohumeral ligament attachments, acromioclavicular joint and coracoid process were injected in his right shoulder. In regard to his thoracic area, the facet joints and costotransverse joints from T4-T10 were injected.

From 2002 until 2008, Michael received a total of eight treatments to his neck with a 75% pain improvement reported in November 2007, six treatments to his shoulder where an 85% pain improvement was noted in

November 2006, and 10 treatments to his thoracic region where a 90% pain improvement was reported in June 2007. He no longer has shoulder pain with transfers or driving. At his last treatment session, his neck pain was down to a 2 (VAS), shoulder pain 1, and thoracic pain 1.

DISCUSSION

This case study illustrates that Prolotherapy can improve the quality of life for quadriplegics. Michael, like many quadriplegics, suffers from chronic pain in his shoulders and neck, most likely from overuse, and also neurogenic pains in his upper and middle back. What primarily



Figure 3. Injection sites for Prolotherapy to the right hip.

brought Michael to get a Prolotherapy evaluation, however, was his decline in standing transfers because of a degenerating hip. Michael, because of his innate tenacity and personality, has not given up on the idea of a quadriplegic standing on his/her own two feet. (See *Figure 4*.) It is well known in the rehabilitation field that standing is an excellent exercise for those with spinal cord injury to prevent pressure sores and slow down the onset of osteoporosis.

In the case presented, Michael received Prolotherapy to his right shoulder. His pain level went from an 8 to a 2 (VAS) with Prolotherapy. Because Michael has no voluntary leg motion, like all quadriplegics, his shoulders feel the major force of all transfers as well as physical and daily living activities.²⁹ All of these activities place a great deal of stress on the bones, joints, and soft tissues of the shoulder complex, placing these structures at significant risk for overuse and injury. Overuse-type injuries are the most common cause of shoulder pain in the chronic SCI population.³⁰ The structures most affected are the rotator cuff tendons. Risk factors for shoulder pain in spinal cord injury include duration of injury, older age, higher body mass index, the use of a manual wheelchair, poor seated posture, decreased flexibility, and muscle imbalances in the rotator cuff and scapular stabilizing muscles.^{31,32} Michael had basically all of these risk factors and made only a little progress with traditional physiotherapy to help his shoulder pain. Prolotherapy to his rotator cuff tendons gradually helped him regain his shoulder function. The shoulder joint, specifically the rotator cuff tendons, are commonly treated with Prolotherapy.^{33,34} Traditionally, the main use of Prolotherapy has been on tendinopathies and ligament sprains in peripheral joints.³⁵⁻³⁷

In regard to his neck, Michael was seen about 30 years after his multilevel fusion. His neck CT scan was done before coming to Caring Medical and showed extensive degenerative changes above and below his fusion. This type of response is very common. After a segment of the spine is fused, increased pressure in the vertebral segments above and below the fusion is typically seen. This additional stress on the adjacent segments seems to increase the rate of degeneration at these joints.³⁸⁻³⁹ Michael responded well to the Prolotherapy of his neck. His pain level went from a 7 to a 2 (VAS). Prolotherapy has a long history of being used in the treatment of spine and joint degenerative arthritis.^{40,41} This is especially true in regard to chronic low back pain arising from



Figure 4. Michael can now stand erect with help from his personal assistant, as well as Prolotherapy.

the sacroiliac joints and as an alternative to surgery.⁴²⁻⁴⁴ Prolotherapy has been shown in low back studies to improve pain levels and range of motion.⁴⁵⁻⁴⁸ In double-blinded human studies the evidence on the effectiveness of Prolotherapy has been considered promising but mixed.⁴⁹⁻⁵⁰ In regard to Prolotherapy studies on the neck Prolotherapy has been shown to be effective for facet joint arthropathy, cervicogenic pain and headaches, and cervical instability.⁵¹⁻⁵³

Michael did not get hip replacement surgery, partly because of his fear of the hip replacement dislocating, which is of increased risk when a person has spastic quadriplegia.⁵⁹ In Michael's case, his major goal was standing and transferring better. He feels that his hip stability is much improved after the Prolotherapy.

Also of interest is that Michael's neurogenic thoracic pain was also significantly reduced with Prolotherapy. Most people with spinal cord injury suffer from abnormal

sensations and pain below the injury site.⁶⁰ These abnormal sensations are often “burning” or “freezing” with pain ranging from mild to severe.⁶¹ When the pain is a burning quality the patient is often labeled as having dysesthetic pain syndrome. About 11% of all SCI patients have painful dysesthesias and another five percent have non-painful but chronic and distressing dysesthesia.⁶²

The term neurogenic pain presumes that the origin of the pain stems from the SCI.

dysesthesia – an unpleasant abnormal sensation

Regardless of the nomenclature, the condition is difficult to treat even with conventional pain-killing drugs.⁶³⁻⁶⁵ Sometimes SCI patients seek neurosurgical procedures to ablate some of the pain tracts in the spinal cord. This usually fails to relieve chronic SCI pain and frequently produces a higher level of neurological loss and deafferentation.^{66,67} Prolotherapy could offer a non-surgical treatment option also for this condition.

deafferentation – the elimination or interruption of sensory nerve fibers

SUMMARY

This case study exhibited many of the difficult to treat pain issues that occur in quadriplegics. Michael presented with neurogenic thoracic pain, a dysplastic painful hip, neck degeneration above and below the level of his fusion, as well as an overuse injury of his right shoulder. We were able to help Michael with all of these conditions through treatment with Prolotherapy. He regained some hip stability which helped him improve his standing pivot transfers and his ability to stand independently. Prolotherapy treatments provided relief of Michael’s shoulder, neck, and thoracic pain. Chronic pain is common after spinal cord injury and is difficult to treat effectively. Further research into Prolotherapy with this patient population seems warranted. ■

BIBLIOGRAPHY

1. Beric, A. Post-spinal cord injury pain states. *Anesthesiology Clinics of North America*. 2003;15:445-463.
2. Dyson-Hudson TA, et al. Shoulder pain in chronic spinal cord injury, Part 1: Epidemiology, etiology, and pathomechanics. *Journal of Spinal Cord Medicine*. 2004;27: 4-17.
3. Jensen M. Chronic pain in individuals with spinal cord injury: a survey and longitudinal study. *International Spinal Cord Society*. 2005;43:704-712.

4. Richards S. Chronic pain and spinal cord injury: review and comment. *The Clinical Journal of Pain*. 1992;8:119-122.
5. Livshits A. The algescic syndrome in spinal cord trauma. *Paraplegia*. 1992;30:497-501.
6. Loubser P. Diagnostic spinal anesthesia in chronic spinal cord injury pain. *Paraplegia*. 1991;29:25-36.
7. Sandford P. Amitriptyline and Carbamazepine in the treatment of dysesthetic pain in spinal cord injury. *Physical Medical Rehabilitation*. 1992;73:300-301.
8. Rintala D, et al. Chronic pain in a community-based sample of men with spinal cord injury: prevalence, severity, and relationship with impairment, disability, handicap, and subjective well-being. *Physical Medical Rehabilitation*. 1998;79:604-614.
9. Fenollos P, et al. Chronic pain in the spinal cord injured: statistical approach and pharmacological treatment. *Paraplegia*. 1993;31:722-729.
10. Summers J. Psychosocial factors in chronic spinal cord pain. *Pain*. 1991;47:183-189.
11. Mariano A. Chronic pain and spinal cord injury. *The Clinical Journal of Pain*. 1992; 8:87-92.
12. Balazy T. Clinical management of chronic pain in spinal cord injury. *The Clinical Journal of Pain*. 1992;8:102-110.
13. Middleton J, et al. Intrathecal Clonidine and Baclofen in the management of spasticity and neuropathic pain following spinal cord injury: a case study. *Physical Medical Rehabilitation*. 1996;77:824-826.
14. Canavero S. Lamotrigine control of central pain. *Pain*. 1996;68:179-181.
15. Richards S. Psychological interventions for chronic pain following spinal cord injury. *The Clinical Journal of Pain*. 1992;8:111-118.
16. Fenollos P, et al. Chronic pain in the spinal cord injured: statistical approach and pharmacological treatment. *Paraplegia*. 1993;31:722-729.
17. Balazy T. Clinical management of chronic pain in spinal cord injury. *The Clinical Journal of Pain*. 1992;8:102-110.
18. Middleton J, et al. Intrathecal Clonidine and Baclofen in the management of spasticity and neuropathic pain following spinal cord injury: a case study. *Physical Medical Rehabilitation*. 1996;77:824-826.
19. Canavero S. Lamotrigine control of central pain. *Pain*. 1996;68:179-181.
20. Richards S. Psychological interventions for chronic pain following spinal cord injury. *The Clinical Journal of Pain*. 1992;8:111-118.
21. Lennard T. *Pain procedures in clinical practice*. 2nd ed. Philadelphia, PA: Hanley & Belfus, Inc., 2000.
22. Lennard T. *Physiatric procedures in clinical practice*. Philadelphia, PA: Hanley & Belfus, Inc., 1995.
23. Hauser R. *Prolo your pain away!* 2nd ed. Oak Park, IL, Beulah Land Press, 2004.
24. Dorman T. *Prolotherapy in the lumbar spine and pelvis*. Philadelphia, PA: Hanley & Belfus, Inc., 1995.
25. Sheeler R. Alternative treatments: dealing with chronic pain. *Mayo Clinic Health Newsletter*. April 2005.

26. Reeves K. Treatment of consecutive severe fibromyalgia patients with Prolotherapy. *Journal of Orthopaedic Medicine*. 1994;16:84-89.
27. Schaeffer M. Heterotopic ossification: treatment of established bone with radiation therapy. *Physical Medical Rehabilitation*. 1995;76:284-28.
28. Demirel G, et al. Osteoporosis after spinal cord injury. *Spinal Cord*. 1998;36:822-825.
29. Finley M. Impact of physical exercise on controlling secondary conditions associated with spinal cord injury. *Neurology Report*. March 2002.
30. Dyson-Hudson T. Shoulder pain in chronic spinal cord injury, part 1: epidemiology, etiology, and pathomechanics. *The Journal of Spinal Cord Medicine*. 27:4-14, 2004.
31. Subbarao JV, et al. Prevalence and impact of wrist and shoulder pain in patients with spinal cord injury. *Journal of Spinal Cord Medicine*. 1995;18:9-13.
32. Waring WP, et al. Shoulder pain in acute traumatic quadriplegia. *Paraplegia*. 1991;29: 37-42.
33. Hackett G. *Ligament and tendon relaxation treated by Prolotherapy*, 5th ed. Oak Park, IL, Gustav A. Hemwall, 1992.
34. Reeves KD. Prolotherapy: present and future applications in soft tissue pain and disability. *Phys Med Rehabil Clin North Am*. 1995;6:917-926.
35. Rabago D., et al. A systematic review of prolotherapy for chronic musculoskeletal pain. *Clin J Sport Med*. Sept 2005;15(5):376-380.
36. Rabago D., et al. A systematic review of four injection therapies for lateral epicondylitis: prolotherapy, polidocanol, whole blood and platelet rich plasma. *British Journal of Sports Medicine*. Nov 21, 2008.
37. Ongley M. Ligament instability of knees: a new approach to treatment. *Manual Medicine*. 1988;3:152-154.
38. Auerback JD. The prevalence of indications and contraindications to cervical total disc replacement. *Spine Journal*. 2008;8:711-716.
39. Nabhan A, et al. Segmental kinematics and adjacent level degeneration following disc replacement versus fusion: RCT with three years of follow-up. *Journal of Long-Term Effects of Medical Implants*. 2007;17:229-236.
40. Ongley M. Ligament instability of knees: a new approach to treatment. *Manual Medicine*. 1988;3:152-154.
41. Hackett G. Prolotherapy in whiplash and low back pain. *Postgrad Med*. 1960;27:214-219.
42. Kayfetz D. Occipital-cervical (whiplash) injuries treated by Prolotherapy. *Medical Trial Technique Quarterly*. 1963; June: 9-29.
43. Merriman J. Prolotherapy versus operative fusion in the treatment of joint instability of the spine and pelvis. *Journal of the International College of Surgeons*. 1964;42:150-159.
44. Hackett G. Shearing injury to the sacroiliac joint. *Journal of the International College of Surgeons*. 1954;22:631-639.
45. Hackett G. Referred pain and sciatica in diagnosis of low back disability. *Journal of the American Medical Association*. 1957;163:183-185.
46. Hackett G. *Ligament and Tendon Relaxation Treated by Prolotherapy*. Springfield, IL: Charles C. Thomas, 1958.
47. Hackett G. Joint stabilization: An experimental, histologic study with comments on the clinical application in ligament proliferation. *American Journal of Surgery*. 1955;89:968-973.
48. Ongley M., et al. A new approach to the treatment of chronic low back pain. *The Lancet*. July 1987:143-147.
49. Echow E. A randomized, double-blinded, placebo-controlled trial of sclerosing injections in patients with chronic low back pain. *Rheumatology*. Oxford. 1999;38(12):1255-9.
50. Klein R., et al. A randomized double-blind trial of dextrose-glycerine-phenol injections for chronic low back pain. *Journal of Spinal Disorders*. 1993;6(1):23-33.
51. Centeno CJ, et al. Fluoroscopically guided cervical prolotherapy for instability with blinded pre and post radiographic reading. *Pain Physician*. Jan 2005;8(1):67-72.
52. Hooper RA., et al. Case studies on chronic whiplash related neck pain treated with intraarticular zygapophysial joint regeneration injection therapy. *Pain Physician*. Mar 2007;10(2):313-318.
53. Linetsky FS., et al. Treatment of cervicothoracic pain and cervicogenic headaches with regenerative injection therapy. *Curr Pain Headache Rep*. Feb 2004;8(1):41-48.
54. Hackett G. *Ligament and tendon relaxation treated by Prolotherapy*. 5th ed. Oak Park, IL: Beulah Land Press, 2002.
55. Reeves KD, et al. Randomized, prospective, placebo-controlled double-blind study of dextrose prolotherapy for osteoarthritic thumb and finger (DIP, PIP, and trapeziometacarpal) joints: evidence of clinical efficacy. *Journal of Alternative and Complementary Medicine*. 2000;6(4):311-320.
56. Reeves KD, et al. Randomized prospective double-blind placebo-controlled study of dextrose prolotherapy for knee osteoarthritis with or without ACL laxity. *Altern Ther Health Med*. 2000;6(2):68-74, 77-80.
57. Hauser R, et al. Standard clinical X-ray studies document cartilage regeneration in five degenerated knees after Prolotherapy. *Journal of Prolotherapy*. 2009;1:22-28.
58. Hauser R, et al. An observational study on Hemwall-Hackett dextrose Prolotherapy for Unresolved Hip Pain at an Outpatient Charity Clinic in Rural Illinois. *Journal of Prolotherapy*. 2009;1:11-21.
59. Albinana J, et al. Painful spastic hip dislocation: proximal femoral resection. *The Iowa Orthopaedic Journal*. 2002;22:61-65.
60. Middleton JW, et al. Management of spinal cord injury in general practice – part 1. *Australian Family Physician*. 2008;37:229-233.
61. Albinana J, et al. Painful spastic hip dislocation: proximal femoral resection. *The Iowa Orthopaedic Journal*. 2002;22:61-65.
62. Stormer S, et al. Chronic pain/dysaesthesiae in spinal cord injury patients: results of a multicentre study. *Spinal Cord*. July 1997;35(7):446-455.
63. Cairns DM, et al. Pain and depression in acute traumatic spinal cord injury: Origins of chronic pain problem? *Archives of Physical Medicine and Rehabilitation*. 1996;77:329-335.
64. Davidoff G, et al. Function-limiting dysesthetic pain syndrome among traumatic spine cord injury patients: a cross-sectional study. *Pain*. 1987;29:39-48.
65. Beric A. Post-spinal cord injury pain states. *Anesthesiology Clinics of North America*. 1997;15:445-463.
66. Nashold BS, et al. The DREZ operation. Modern techniques in surgery. *Neurosurgery*. 1984;35:1-17.
67. Balazy TE. Clinical management of chronic pain in spinal cord injury. *Clinical Journal of Pain*. 1992;8:102-110.