Medical Research Archives

European Society of Medicine

OPEN ACCESS

Published: December 31, 2023

Citation: Kersschot, J., et al., 2023. Treatment of failed back surgery syndrome with regional sugar water injections: A clinical case report. Medical Research Archives, [online] 11(12). https://doi.org/10.18103/mra.v11i12.4889

DOI:
https://doi.org/10.18103/mra.v11i12.4889

ISSN: 2375-1924

CASE REPORT

Treatment of failed back surgery syndrome with regional sugar water injections: A clinical case report

Jan Kersschot[1], King Hei Stanley Lam[2*], Teinny Suryadi[3], Lisa Nurhasanah[4], Tanti Atjoe Kesoema[5]

[1]Private Practice, Lindelei 38, Aartselaar, Belgium
[2]The Department of Clinical Research, The Hong Kong Institute of Musculoskeletal Medicine, Hong Kong
[3]Department of Physical Medicine and Rehabilitation, Hermina Podomoro Hospital. Jakarta, Indonesia
[4]Physical Medicine and Rehabilitation, Diponegoro University, Indonesia
[5]Physical Medicine and Rehabilitation, Diponegoro University, Indonesia

*drlamkh@gmail.com

ABSTRACT

Failed back surgery syndrome is a chronic pain condition that persists despite or after surgical intervention. It presents a disabling condition that is difficult to manage. Over the last decade, regional sugar water injections have become popular for the treatment of musculoskeletal and neuropathic pain syndromes. This article describes the case of a patient with persistent pseudo-sciatica despite surgery who underwent multiple sessions of sugar water injections. This study aimed to share this experience with the global medical community. Further clinical investigations are required to confirm whether this novel approach can effectively treat patients with this condition.

Keywords: sugar water injections, failed back surgery syndrome, D5W, glucopuncture, sacroiliac ligament, gluteus minimus trigger point, pseudosciatica.

Introduction

Failed back surgery syndrome (FBSS) refers to pain of unknown origin that persists despite surgical intervention or appears after spinal surgery[1,2,3,4]. Patients with FBSS are not responsive to oral NSAIDs or paracetamol/ acetaminophen therapy. In some countries, narcotic addiction has become a major concern for patients with FBSS[5]. In this study, we hypothesized that a series of regional dextrose 5% in sterile water (D5W) injections were a potential solution for some cases of FBSS[6]. When evaluating a patient with FBSS, it is crucial to consider pre-existing causes of lower back pain that may have been present preoperatively, such as trigger points in the interspinous and supraspinous ligaments, trigger points in the paraspinal muscles and fascial defects in the thoracolumbar fascia. In cases of pseudo-sciatica, trigger points can also be identified in the ipsilateral sacroiliac (SI) posterior ligament or the gluteus musculature. Such trigger points are not visible on ultrasound or magnetic resonance imaging (MRI) but can only be identified during clinical examination. However, chronic pseudo-sciatica can also be caused by scar tissue formation at the surgical site. Consequently, D5W injections into the trigger points are not effective in assisting these patients, who should instead be referred for more sophisticated pain treatments[7,8]. Epidural D5W injection may also be an option for patients with FBSS[9,10]. This is the first clinical case report, that a patient with FBSS is treated with D5W injections into trigger points in the ipsilateral SI ligament and gluteus minimus.

Application of sugar–water injections

Sugar water injections represent a novel nonsteroidal injection therapy for the management of various non-rheumatic musculoskeletal conditions[11,12,13,14]. These consist of a series of local injections of D5W. Similar effects were observed in Europe when 5% glucose was applied; however, local anesthetics were not required, and no steroids were added to the injectates. Moreover, these injections can be administered to patients with diabetes because the total amount of glucose injected is low and it is injected locally. In addition, most of the sugar water is metabolized at the injection site and does not enter the blood flow.

History of D5W Injections

D5W injections were first described in Korea 26 years ago for the management of myofascial pain[15]. Subsequently, it has been used to treat Achilles tendinopathy[16], carpal tunnel syndrome[17,18,19], failed back surgery syndrome[20], epidural injections[21,22], nerve hydrodissection[23,24,25], ankle pain[26], frozen shoulders[27] and hamstring injury[28]. Over the last decade, D5W injections have gained increasing global popularity; however, research in this field is limited[29,30] due to the lack of funding and interest from pharmaceutical companies. Notably, the application of regional injections of D5W is considered off-label, as D5W was originally designed for IV administration.

Regional Injections of D5W vs. Steroid

D5W has demonstrated efficacy comparable to that of steroids in treating chronic rotator cuff tendinopathy and ulnar neuropathy[31,32].

While steroid injections are more effective in the short term, their long-term effectiveness is less pronounced. D5W was more effective than triamcinolone in a carpal tunnel study at 4–6 months[33]. Recently, clinical researchers have illustrated that ultrasound-guided D5W injections into the carpal tunnel have similar efficacy as steroids for improving pain intensity, functional limitation in daily life, electrophysiological parameters, and ultrasonographic outcomes[34,35,36]. Both systemic review and meta-analysis have shown that ultrasound-guided perineural injection of D5W is more effective than steroid in treatment carpal tunnel syndrome[37].

Goals of Regional D5W Injections

The goals of regional D5W injections are to modulate referred pain and support tissue repair[38]. Achieving these goals involves a dual approach: pain modulation through intradermal and perineural injections and functional improvement by administering injections into dysfunctional soft tissues such as muscles and ligaments. In addition, D5W can be injected into joint cavities, around peripheral nerves, or into the epidural space; however, these techniques are not the topic of this study. This case report presents an easy-to-apply injection technique with an interesting risk-benefit ratio. It is hoped that clinicians will gradually replace steroid injections with D5W injections in daily medical practice. They need to learn to look for painful points in the muscles and ligaments and inject with sessions of D5W. For example, pseudosciatic pain commonly originates from myofascial trigger points in the lower back and thigh area[38,39]. In addition, ligament injuries of the lower back can cause local and referred pain[40]. Therefore, trigger points are not visible on MRI or ultrasound (US) and clinical examination is crucial. When physicians notice the clinical results of these easy-to-apply injections, they can further refine their technique by incorporating fluoroscopy- or ultrasound-guided D5W injections.

Case Presentation

A 36-year-old lawyer reported with severe pain in the lower back for more than 9 months. Pain radiated to the left buttock and calf. MRI revealed a herniated disc at L4-L5 on the left side. The Numerical Rating Scale (NRS) indicated an 8/10 level of pain. The Oswestry Disability Index (ODI)[41] was 65%, indicating that the pain significantly affected his daily life. Painkillers and NSAIDs did not provide relief; therefore, he agreed to remove the herniated disc surgically. The surgical intervention resulted in immediate improvement (NRS 2/10, ODI 20%); however, this improvement lasted for less than a week. The pain recurred quickly (NRS, 6/10; ODI, 50%) and affected the left lumbosacral region, left buttock, thigh, and calf. In addition, the pain did not respond to tramadol or NSAIDs.

Since the patient had no lasting results after the surgical removal of the hernia, it was postulated that there could be another cause of his current back and leg pain. Clinical examination revealed tenderness upon palpation of the left SI ligament (FIG A) and a sore point on the left buttock (FIG B). The ligamentous trigger point (LTP) in the SI ligament was superficial. The exact location and depth of injection were determined by palpation. The sore point in the buttock muscle is a myofascial trigger point (MTP) located deep within the gluteus muscle. As such sore points cannot be identified using ultrasonography or MRI, these points are often ignored by many physicians.

After attaining ethical approval and patient consent, regional treatment was started. In each session, the patient received two injections (Table 1). He received a 5 mL injection into the left SI ligament at a depth of 2–4 cm (0,8 – 1,6 in) with a 4-cm 27 G needle (FIG A) and another 10 mL injection into the trigger point in the left gluteus minimus muscle at a depth of 4–8 cm (1,5-3 in) with an 8-cm 23 G needle (FIG B). It is important to administer the injection exactly at the painful point. Accurate injection placement is crucial, requiring the physician to know the depth and angle necessary for the needle to reach the trigger point. This technique cannot be illustrated in drawings or photographs as it is based primarily on information found during clinical examinations. Moreover, no injections were administered to the surgical sites.

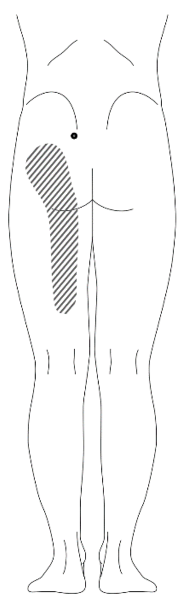

FIG A: Injection of D5W in the left SI ligament

The black dot represents the injection site, and the shaded zone represents a typical region of pain referred from a ligamentous trigger point in the SI posterior ligament.

FIG B: Injection of D5W in the left gluteus minimus muscle

The black dot represents the injection site. The shaded zone represents a typical region of pain referral from a trigger point in the posterior part of the left gluteus minimus muscle. Trigger points in the lateral part of the gluteus minimus primarily indicate pain in the lateral parts of the thigh and calf.

Table 1: Overview of Trigger Point Injections Each Session

A/ Left SI Ligament	D5W Injection	5 mL	IL
B/ Left Gluteus Minimus Muscle	D5W Injection	10 mL	IM

After three weekly sessions with D5W, the pain improved by approximately 50% (NRS, 3/10; ODI, 25%). After three more sessions every 2 weeks, the pain disappeared almost completely (NRS, 1/10; ODI, 10%). A follow-up at 4 months revealed no recurrence of the pseudosciatic pain with the same condition (NRS 1/10, ODI, 10%). The patient did not follow a physiotherapy program and did not take any painkillers or other medications during this period.

Discusssion

Over the last two decades, regional D5W injections have become popular for the treatment of musculoskeletal and neuropathic pain. It is not clear yet if this injection technique can be useful for FBSS patients. In this clinical case, a patient with FBSS received a series of injections in the gluteus minimus muscle and posterior SI ligament with D5W[42]. After six sessions, the patient reported to be almost completely free from his pain in the low back and left leg.

Mechanisms of Action of Dextrose

When injected into the extracellular matrix, glucose is transported across the cell membrane via a specific saturable transport system[43,44,45]. This transport system includes two major types of glucose transporters: sodium-dependent glucose transporters, which transport glucose against a concentration gradient, and sodium-independent glucose transporters, which transport glucose by facilitating its diffusion along a concentration gradient[46,47]. Glucose supports intracellular adenosine triphosphate (ATP) metabolism. Furthermore, it has been illustrated that ATP injection increases the expression of several markers for regenerative activity in sensory neurons, including phospho-STAT3 and GAP43[48]. Researchers have found that ATP infusion improves spontaneous pain and tactile allodynia in patients with neuralgia[49,50]. Most researchers have confirmed that the pharmacological effects of D5W injections include stabilization of neural activity, normalization of regional glucose metabolism, and decreased neurogenic inflammation, reducing neuropathic pain via multifactorial mechanisms[51]. Dextrose has been speculated to indirectly inhibit capsaicin-sensitive receptors (such as the transient receptor potential vanilloid receptor-1) and block the secretion of substance P and calcitonin gene-related peptides, which are pro-nociceptive substances involved in neurogenic inflammation[25]. Further studies are needed to explore the pharmacological mechanisms of D5W injection in musculoskeletal and neuropathic pain management.

Conclusion

FBSS refers to pain that persists despite surgical intervention or appears after spinal surgery. In this clinical case report, the patient received several injections in the lower back region using D5W. After six sessions, the patient was almost completely pain-free. Further clinical research is required to confirm whether this novel approach can become a potential treatment strategy for patients with FBSS. Large controlled trials are required to confirm the efficacy of D5W injections in patients with FBSS, with a clear change in pain scores and the disability index. Furthermore, additional studies are required to determine the optimal dosage, location, and frequency of regional D5W injections.

Conflicts of Interest Statement:

All authors disclose all financial relationships (including employment, grants, patent ownership, and other interests) with any commercial entities that have an interest in the subject matter or materials discussed in the manuscript.

Acknowledgements Statement:

None

Funding Statement:

None

References:

1. Orhurhu VJ, Chu R, Gill J. Failed back surgery syndrome. 2020 Jul 10. In: StatPearls [Internet]. Treasure Island (FL): *StatPearls Publishing*; 2020.

2. Weigel R, Capelle HH, Al-Afif S, Krauss JK. The dimensions of "failed back surgery syndrome": what is behind a label? *Acta Neurochir (Wien)*. 2021;163(1):245-250.

3. Alizadeh R, Sharifzadeh SR. Pathogenesis, etiology and treatment of failed back surgery syndrome. *Neurochirurgie*. 2022;68(4):426-431.

4. Xu W, Ran B, Zhao J, Luo W, Gu R. Risk factors for failed back surgery syndrome following open posterior lumbar surgery for degenerative lumbar disease. *BMC Musculoskelet Disord*. 2022 31;23(1):1141.

5. Chen YC, Lee CY, Chen SJ. Narcotic addiction in failed back surgery syndrome. *Cell Transplant*. 2019;28(3):239-247.

6. Solmaz İ, Akpancar S, Örsçelik A, Yener-Karasimav Ö, Gül D. Dextrose injections for failed back surgery syndrome: a consecutive case series. *Eur Spine J*. 2019;28(7):1610-1617.

7. Tomycz ND, Ortiz V, Moossy JJ. Simultaneous intrathecal opioid pump and spinal cord stimulation for pain management: analysis of 11 patients with failed back surgery syndrome. *J Pain Palliat Care Pharmacother*. 2010;24(4):374-83.

8. Tapias Pérez JH. Spinal cord stimulation: beyond pain management. *Neurologia (Engl Ed)*. 2022 Sep;37(7):586-595.

9. Maniquis-Smigel L, Dean Reeves K, Jeffrey Rosen H, Lyftogt J, Graham-Coleman C, Cheng AL, Rabago D. Short term analgesic effects of 5% dextrose epidural injections for chronic low back pain: A randomized controlled trial. *Anesth Pain Med*. 2016; 6(1):425504.

10. Pandey N, Nayak P, Gahnolia V. A randomized control trial on efficacy of analgesic effect of 5% dextrose caudal epidural injection for non-specific low back pain. *International Journal of Scientific Research*. 2021;10(9):11-13.

11. Lam KHS, Hung CY, Chiang YP, Onishi K, Su DCJ, Clark TB, Reeves KD. Ultrasound-guided nerve hydrodissection for pain management: Rationale, methods, current literature, and theoretical mechanisms. *J Pain Res*. 2020; 4(13):1957-1968.

12. Kersschot J. Glucopuncture for rotator cuff related shoulder pain: an alternative for cortisone? *Clin Rev Cases*. 2022; 4(2):1-4.

13. Kersschot J, Karavani I. Isotonic glucose injections for postherpetic neuralgia in the elderly. *Cureus*. 2022;14(9):29740.

14. Kersschot J, Mathieu T. Treatment of painless nodules with glucopuncture in dupuytren's disease in men: A clinical case. *Cureus*. 2022;14(11):31445.

15. Kim MY, Na YM, Moon JH. Comparison on treatment effects of dextrose water, saline and lidocaine for trigger point injection. *J Korean Acad Rehab Med* 1997;21:967-973.

16. Lyftogt J. Prolotherapy and Achilles tendinopathy: a prospective pilot study of an old treatment. *Australas Musculoskel Med*. 2005;10:16-19.

17. Wu YT, Ke MJ, Ho TY, Li TY, Shen YP, Chen LC. Randomized double-blinded clinical trial of 5% dextrose versus triamcinolone injection for carpal tunnel syndrome patients. *Ann Neurol*. 2018; 84(4): 601-610.

18. Wu YT, Ho TY, Chou YC, Ke MJ, Li TY, Tsai CK, Chen LC. Six-month efficacy of perineural dextrose for carpal tunnel syndrome: A prospective, randomized, double-blind, controlled trial. *Mayo Clin Proc*. 2017;92(8):1179-1189.

19. Ho TY, Chen SR, Li TY, Li CY, Lam KHS, Chen LC, Md YW. Prognostic factors in carpal tunnel syndrome treated with 5% dextrose perineural injection: A retrospective study. *Int J Med Sci*. 2021;18(9):1960-1965.

20. Solmaz İ, Akpancar S, Örsçelik A, Yener-Karasimav Ö, Gül D. Dextrose injections for failed back surgery syndrome: a consecutive case series. *Eur Spine J*. 2019;28(7):1610-1617.

21. Maniquis-Smigel L, Dean Reeves K, Jeffrey Rosen H, Lyftogt J, Graham-Coleman C, Cheng AL, Rabago D. Short term analgesic effects of 5% dextrose epidural injections for chronic low back pain: A randomized controlled trial. *Anesth Pain Med*. 2016;6 (1):e42550.

22. Pandey N, Nayak P, Gahnolia V. A randomized control trial on efficacy of analgesic effect of 5% dextrose caudal epidural injection for non-specific low back pain. *International Journal of Scientific Research*. 2021;10 (9):11-13.

23. Lam KHS, Hung CY, Chiang YP, Onishi K, Su DCJ, Clark TB, Reeves KD. Ultrasound-guided nerve hydrodissection for pain management: rationale, methods, current literature, and theoretical mechanisms. *J Pain Res*. 2020;4(13):1957-1968.

24. Lam KHS, Lai WW, Ngai HY, Wu WKR. Practical considerations for ultrasound-guided hydrodissection in pronator teres syndrome. *Pain Med*. 2022;23(1):221-223.

25. Lam KHS, Lai WW, Ngai HY, Wu WKR, Wu YT. Comment on the safety of the ultrasound-guided hydrodissection technique for carpal tunnel syndrome. *J Ultrasound*. 2022:1-3

26. Ferrie J, Kersschot J, Treatment of lateral ankle pain with glucopuncture: A clinical case. *World Journal of Advanced Research and Reviews*, 2023;19(01):1012-1016.

27. Kersschot J, Intra-articular Glucose Injections for Orthoregeneration of Frozen Shoulder. A Clinical Case. *Medical Research Archives*. 2023:11(8).

28. Kersschot J, Laverde D, Treatment of grade 1 hamstring injury with glucopuncture: a clinical case. *World Journal of Advanced Research and Reviews*. 2023;19(03):1084-1089.

29. Cherng J-H, Chang S-J, Tsai H-D, Chun C-F, Fan G-Y, Reeves KD, Lam KHS, Wu Y-T. The potential of glucose treatment to reduce reactive oxygen species production and apoptosis of inflamed neural cells in vitro. *Biomedicines*. 2023;11(7):1837.

30. Lam KHS, Su DCJ, Wu Y-T, Fajardo Pérez M, Reeves KD, Peng P, Fullerton B. Infraspinatus fascial dysfunction as a cause of painful anterior shoulder snapping: its visualization via dynamic ultrasound and its resolution via diagnostic ultrasound-guided injection. *Diagnostics*. 2023;13(15):2601.

31. Amanollahi A, Asheghan M, Hashemi S. Subacromial corticosteroid injection versus subcutaneous 5% dextrose in patients with chronic rotator cuff tendinopathy: A short-term randomized clinical trial. *Interventional Medicine and Applied Science IMAS*. 2020;11(3):154-160.

32. Chen LC, Ho TY, Shen YP, Su YC, Li TY, Tsai CK, Wu YT. Perineural dextrose and corticosteroid injections for ulnar neuropathy at the elbow: A randomized double-blind trial. *Arch Phys Med Rehabil*. 2020;101(8):1296-1303.

33. Mansiz-Kaplan B, Nacir B, Pervane-Vural S, Tosun-Meric O, Duyur-Cakit B, Genc H. Effect of perineural dextrose injection on ulnar neuropathy at the elbow: A randomized, controlled, double-blind study. *Arch Phys Med Rehabil*. 2022;103(11):2085-2091.

34. Wu YT, Ke MJ, Ho TY, Li TY, Shen YP, Chen LC. Randomized double-blinded clinical trial of 5% dextrose versus triamcinolone injection for carpal tunnel syndrome patients. *Ann Neurol*. 2018;84(4):601-610.

35. Babaei-Ghazani A, Moradnia S, Azar M, Forogh B, Ahadi T, Chaibakhsh S, Khodabandeh M, Eftekharsadat B. Ultrasound-guided 5% dextrose prolotherapy versus corticosteroid injection in carpal tunnel syndrome: a randomized, controlled clinical trial. *Pain Manag*. 2022;12(6):687-697.

36. Nasiri A, Motlagh FR, Vafaei MA, Efficacy comparison between ultrasound-guided injections of 5% dextrose with corticosteroids in carpal tunnel syndrome patients, *Neurological Research* 2023;8:1-10

37. Lam KHS, Wu YT, Reeves KD, Galluccio F, Allam AE, Peng PWH. Ultrasound-Guided Interventions for Carpal Tunnel Syndrome: A Systematic Review and Meta-Analyses. *Diagnostics (Basel)* 2023 Mar 16;13(6):1138

38. Kersschot J, Glucopuncture: A clinical guide to regional glucose 5% injections. *B P International (India/UK*). 2023:16-18

39. Hammi C, Schroeder JD, Yeung B. Trigger point injection. 2023 Jul 24. In: StatPearls [Internet]. Treasure Island (FL): *StatPearls Publishing*; 2023.

40. Appasamy M, Lam C, Alm J, Chadwick AL. Trigger point injections. *Phys Med Rehabil Clin N Am*. 2022;33(2):307-333.

41. Fairbank JC, Pynsent PB. The oswestry disability index. *Spine*. 2000:25(22):2940-2952

42. Podesta L, Honbo ES, Mattfeld R, Khadavi M. Orthobiologic treatment of ligament injuries. *Phys Med Rehabil Clin N Am*. 2023;34(1):135-163.

43. Gyimesi G, Pujol-Giménez J, Kanai Y, Hediger MA. Sodium-coupled glucose transport, the SLC5 family, and therapeutically relevant inhibitors: from molecular discovery to clinical application. *Pflugers Arch*. 2020; 472(9):1177-1206.

44. Jurcovicova J. Glucose transport in brain - effect of inflammation. *Endocr Regul*. 2014; 48(1):35-48.

45. Pragallapati S, Manyam R. Glucose transporter 1 in health and disease. *J Oral Maxillofac Pathol*. 2019;23(3):443-449.

46. Gyimesi G, Pujol-Giménez J, Kanai Y, Hediger MA. Sodium-coupled glucose transport, the SLC5 family, and therapeutically relevant inhibitors: from molecular discovery to clinical application. *Pflugers Arch*. 2020; 472(9):1177-1206.

47. Jurcovicova J. Glucose transport in brain - effect of inflammation. *Endocr Regul*. 2014; 48(1):35-48.

48. Pragallapati S, Manyam R. Glucose transporter 1 in health and disease. *J Oral Maxillofac Pathol*. 2019;23(3):443-449.

49. Wu D, Lee S, Luo J, Xia H, Gushchina S, Richardson PM, Yeh J, Krügel U, Franke H, Zhang Y, Bo X. Intraneural injection of ATP stimulates regeneration of primary sensory axons in the spinal cord. *J Neurosci*. 2018;38(6):1351-1365.

50. Moriyama M, Kitamura A, Ikezaki H, Nakanishi K, Kim C, Sakamoto A, Ogawa R.

Systemic ATP infusion improves spontaneous pain and tactile allodynia, but not tactile hypesthesia, in patients with postherpetic neuralgia. *J Anesth*. 2004;18(3):177-80.

51. Hayashida M, Fukuda K, Fukunaga A, Meno A, Sato K, Tarui K, Arita H, Kaneko Y, Hanaoka K. Analgesic effect of intravenous ATP on postherpetic neuralgia in comparison with responses to intravenous ketamine and lidocaine. *J Anesth*. 2005;19(1):31-5.