

Case Study: Hyrosurgical Decompression of a Large Lumbar Disc Herniation

Gabriele Jasper MD, Otto Fisher DC, Didier Demesmin MD
Accucare Pain Medicine
Milltown, NJ

Introduction

Research indicates that the success of traditional microdiscectomy is limited in part by the resulting incompetence of the annulus following disc decompression procedures for sciatica¹. A variety of percutaneous approaches have been developed to directly address the disc in chronic back and leg pain, avoiding the surgical annulotomy and its attendant potentially damaging consequences^{2,3,4}. However, currently available percutaneous discectomy tools such as the ArthroCare SpineWand[®] and the Stryker Dekompressor[®] are limited in their ability to address large lumbar herniations, with most clinical studies limiting inclusion criteria to patients with herniations of less than 6 mm and/or no larger than one-third the sagittal diameter of the spinal canal^{2,3}.

The present case illustrates use of a new hydrosurgical method (HydroDiscectomy[™]) for disc decompression in which anatomical reduction of a large defect with successful short-term outcome was achieved.

Case History

A 30 year-old male landscaper presented with a history of chronic low back pain greater than leg pain refractory to medical and initial interventional pain treatment. At the time of presentation, conservative treatment had consisted of chiropractic, physical therapy, two weeks of bed rest, and epidural steroid injections. The patient was receiving high doses of narcotics and had been out of work for three months on disability. Our practice provided treatment using Coblation Nucleoplasty in conjunction with a transforaminal epidural injection, which resulted in no improvement. Nine months of both conservative and interventional treatment had failed to significantly improve the patient's symptoms. Examination on MRI revealed a 9 (plus) mm left paracentral disc herniation at L5/S1 (Figure 1).

HydroDiscectomy disc decompression using the SpineJet Hydrosurgery System[™] (HydroCision, Inc., Billerica, MA) was performed percutaneously at Robert Wood Johnson Ambulatory Surgical Center under local anesthesia, allowing rapid, safe and precise removal of disc nuclear material. After the procedure, the patient experienced complete pain relief, went home the same day, returned to light duty work after 7 days, resumed full duty employment in 8 weeks, and at 6 months remains pain-free. Repeat MRI examination by the same radiologist on the same magnet reveals interval diminution in the size of the disc herniation from 9 (plus) mm to 2 mm (Figure 2).

Figure 1. Large left paracentral L5/S1 disc herniation prior to decompression. Patient had failed multiple epidural steroid injections and Coblation Nucleoplasty.



Figure 2. Reduction of defect after HydroDiscectomy. Patient experienced complete short-term relief of symptoms.



Discussion

While discectomy is an accepted technique for the treatment of radicular symptoms, its use is not without limitations and complications¹. Use of traditional approaches and surgical instruments in microsurgical discectomy may limit the effectiveness of this procedure to cases involving relatively large defects due to the annular damage inflicted by the surgical instruments when smaller herniations are repaired¹. It has been postulated that newer percutaneous techniques of disc decompression may represent an opportunity to address contained defects of less than 6 mm safely and effectively³. Conversely, it has also been observed that repair of large defects can be difficult when methods employing IDET or other debulking procedures that do not mechanically remove disc material are used².

The SpineJet™ Hydrosurgery System for HydroDiscectomy represents the first commercially available non-thermal, fluidjet-based instrument specifically designed for percutaneous discectomy. Fluidjet technology allows safe, fast and accurate simultaneous resection and removal of disc nuclear material while preserving the surrounding tissue. Preliminary clinical results in our practice suggest an average 5-point reduction in pain on a Visual Analog Scale (VAS, 10 point scale) after HydroDiscectomy.

When the primary symptom is chronic discogenic low back pain, disc decompression of any sort is controversial. However, a recent review of the percutaneous discectomy literature suggests that this type of approach may have a role in the treatment of chronic discogenic pain⁵. The importance of inflammagens in both non-specific back pain and compressive nerve root pain has recently been recognized⁵, leading to an increased emphasis on the direct removal or debulking of disc material through minimally invasive percutaneous techniques. Intradiscal electrothermal annuloplasty (IDET™) has been proposed as an alternative to anterior lumbar interbody fusion⁶. However, recent placebo-controlled randomized trials failed to substantiate the utility of IDET in treating chronic low back pain⁶.

Coblation Nucleoplasty represents a method of disc debulking for which limited clinical support in relieving discogenic back and leg pain is currently available⁵. It has been experimentally associated with unpredictable and potentially risky results due to transient thermal increases leading to unacceptably high accumulated thermal doses in surrounding tissue in a cadaveric model⁷. The risks associated with thermal energy are obviated with the HydroDiscectomy technique.

Conclusion

The present case illustrates a successful short-term outcome and objective result following hydrosurgical decompression of a large lumbar disc herniation for chronic back and leg pain. HydroDiscectomy is a new technique that may be useful on larger herniations that cannot be effectively treated with other percutaneous discectomy methods. Further study is warranted.

References

1. Carragee EJ, Han MY, Suen PW, Kim D. Clinical outcomes after lumbar discectomy for sciatica: the effects of fragment type and annular competence. *J Bone Joint Surg Am.* 2003 Jan;85-A(1):102-8.
2. Alo KM, Wright RE, Sutcliffe J, Brandt SA. Percutaneous lumbar discectomy: clinical response in an initial cohort of fifty consecutive patients with chronic radicular pain. *Pain Practice* 2004;4(1):19-29.
3. Singh V, Piryani C, Liao K. Role of percutaneous disc decompression using coblation in managing chronic discogenic low back pain: a prospective, observational study. *Pain Physician* 2004;7:419-25.
4. Welch WC, Gerszten PC. Alternative strategies for lumbar discectomy: intradiscal electrothermy and nucleoplasty. *Neurosurg Focus.* 2002 Aug 15;13(2):E7.
5. Boswell MV, Shah RV, Everett, CR, et al. Interventional Techniques in The Management of Chronic Spinal Pain: Evidence-Based Practice Guidelines. *Pain Physician.* 2005;8:1-47.
6. Chou LH, Lew HL, Coelho PC, Slipman CW. Intradiscal electrothermal annuloplasty. *Am J Phys Med Rehabil.* 2005 Jul;84(7):538-49.
7. Nau WH, Diederich CJ. Evaluation of temperature distributions in cadaveric lumbar spine during nucleoplasty. *Phys Med Biol.* 2004 Apr 21;49(8):1583-94.

SpineWand and Coblation Nucleoplasty are registered trademarks of ArthroCare Corp.

Dekompressor is a registered trademark of Stryker Corp.
IDET is a trademark of Smith and Nephew, Inc.

HydroDiscectomy and SpineJet are trademarks of HydroCision, Inc.

HydroCision®
The Leader in Hydrosurgery™

22 Linnell Circle
Billerica, MA 01821
Phone: (888) 747-4470
Fax: (978) 600-5058
www.hydrocision.com

1000-1843 Rev A, 10/05