

Thoracolumbar disc herniation: a hidden cause of monosymptomatic nocturnal enuresis

1. **Eric Chun-Pu Chu**, BSc, DC, FRCC; E-mail: eric@nymg.com.hk;

New York Chiropractic and Physiotherapy Centre,

41/F Langham Place Office Tower, 8 Argyle Street, Hong Kong SAR, China.

2. **Patrick Sim**, BSc, MChiro; E-mail: patrick.sim@acc.sa.edu.au

Australian Chiropractic College, 83 Currie Street, Adelaide, SA 5000, Australia

Tel: +61-414-634016

ABSTRACT

A 30-year-old male with a 4-year history of chronic back pain complained of recent episodes of sharp mid back pain referred to his right sacroiliac joint and gluteal area, presumably resulting from twisting injury occurred while playing basketball one week prior. Magnetic resonance imaging showed obvious intervertebral disc degeneration and a right paracentral soft disc herniation compressing the spinal cord at the T12/L1 level. The patient experienced significant pain relief and was able to regain significant mobility of his mid back within two weeks after starting chiropractic care. Moreover, the patient also reported a multi-year history of nocturnal enuresis without daytime symptoms. He unexpectedly found that the symptoms of enuresis spontaneously resolved during the course of treatment. Monosymptomatic nocturnal enuresis under discussion was an uncommon consequence of spinal cord compression (conus medullaris syndrome) caused by thoracolumbar disc herniation.

Key words: Chiropractic, conus medullaris, disc herniation, monosymptomatic enuresis, spinal cord compression

INTRODUCTION

Nocturnal enuresis, also called bedwetting, is an involuntary urination while sleeping, after the age at which continence has been achieved. It is a common problem in

children, but can affect people of any age. This problem affects about 1 to 2% of people over the age of 15 years [1]. According to the South African guidelines on enuresis– 2017, isolated enuresis without associated lower urinary tract symptoms or history of bladder dysfunction is defined as monosymptomatic enuresis [2]. Causative factors for monosymptomatic enuresis include nocturnal polyuria, decreased bladder capacity, detrusor overactivity, associated sleep arousal disorders, global developmental delay and genetics [3]. Many people suffering from monosymptomatic enuresis never seek help because of a sense of shame and those that do, more often than not, are left with an unexplained etiology for their complaint. These disease-associated conditions can be challenging and can have a substantial impact on a patient's quality of life. This case report provides circumstantial evidence of an association between monosymptomatic nocturnal enuresis and spinal cord compression (conus medullaris syndrome) due to symptomatic disc herniation.

CASE REPORT

A 30-year-old, male, office worker complained of recent episodes of sharp mid-back pain referred to the right sacroiliac and gluteal regions. His symptoms resulted from a twisting injury to the mid and low back while playing basketball one week prior to presentation. He had a history of mild back pain over the past four years but never of this severity. Magnetic resonance imaging (MRI) revealed marginal osteophytes of the thoracolumbar spine, narrowing of the T10/T11, T11/T12 and T12/L1 interspaces, and a right paracentral soft-disc herniation compressing the spinal cord at the T12/L1 level. During orthopedic consultation, the patient was deemed a nonsurgical candidate and referred for chiropractic management for his back pain.

Upon presentation, the patient rated the mid back pain as a 6/10 on the numeric pain scale. Physical examination revealed limited range of motion in lumbar flexion due to pain, mild weakness (4/5 strength) of right ankle dorsiflexion, and preserved knee jerks and leg muscle strength. The back pain which radiated to his right gluteal region could be reproduced with passive lumbar extension and right lumbar flexion. Palpation of the T12/L1 intervertebral segment revealed point tenderness while spinal percussion of the segment induced Lhermitte's sign (a shock-like sensation). Mobility restrictions were present in the right thoracolumbar region. Local tenderness and

hyperesthesia of the skin over the right lumbar paraspinal region was detected on the skin pinch-roll test. Based on the findings of the physical examination and MRI, the patient was diagnosed with degenerative spondylosis and symptomatic T12/L1 disc herniation.

The initial phase of chiropractic treatment consisted of thermal ultrasound therapy and thoracolumbar spine manipulation, which aimed to improve mobility and restore neurological function. Frequency of treatment was initially three times weekly. Significant pain relief and restoration of spinal mobility was achieved after two weeks. His treatment frequency was then reduced to once weekly for a further four weeks to enhance spinal function. During the course of treatment, the patient acknowledged that he had also been suffering from nocturnal enuresis for some time, but no underlying cause to his condition was found. It was not associated with lower urinary tract symptoms or daytime incontinence. He also stated that since beginning chiropractic treatment his nocturnal enuresis had improved and had a significant reduction in episode occurrence. Although the patient was able to resume normal daily activities and achieve consistent dry nights at completion of treatment, he continued monthly chiropractic sessions to maintain spinal function. Two years after treatment, he remained pain free and stayed dry at night.

DISCUSSION

The majority of thoracic herniated discs are asymptomatic. The thoracic spine is not very mobile due to the first through to tenth ribs articulate with the respective vertebrae and the sternum. In addition, the thoracic spine participates in less mobile and weight-bearing activities, thoracic herniated discs usually go unnoticed during daily activities. This circumstance is more likely to be present with soft disc herniation [4]. The acute inflammatory symptoms from disc herniation often disappear in a few weeks [4,5]. On the other hand, degenerative, chronic inflammatory and biochemical changes could facilitate the herniated fragment to adhere to, and be stabilized on, the adjacent tissues [6]. As seen in the current case, compressive symptoms of the spinal cord were probably aggravated by migration of a disc fragment resulting from quick waist twisting while playing basketball.

The conus medullaris is the distal tapering end of the spinal cord [7]. In an average adult, the conus medullaris is located at the level between T12 to L2 vertebrae and can sometimes be lower [7]. The conus medullaris consists of S2–S5 nerve roots (**Figure 1**), of which the neurons in the S2–S4 segments supply the parasympathetic ganglia in the bladder musculature and the somatic motor innervation to the external urethral sphincter. Conus medullaris syndrome (CMS) results when there is a compression around the thoracolumbar junction to the spinal cord [8]. Symptoms vary and depend on the level and extent of the neural compression. A pure CMS represents a spectrum of neurological deficits consisting of bladder/bowel dysfunction, saddle anesthesia and sexual dysfunction, without lower extremity weakness [8]. The most common cause of CMS is intervertebral disc herniation [9]. Direct compression of the spinal cord by a relatively small volume of soft material is likely to be less symptomatic [6].

Causes of monosymptomatic nocturnal enuresis remain unclear. Given that this patient's enuresis began insidiously and resolved spontaneously while receiving chiropractic care for symptomatic disc herniation, it is assumed that enuresis was a neurological symptom from spinal cord compression, i.e., CMS. Inflammatory, biomechanical or pathological changes of the herniated disc could lead to irritation or entrapment of the S2–S4 nerve roots, causing instability of micturition reflex. Most of the time, the pontine micturition center still overrode the micturition reflex, but falling asleep would cause rather weak control over the irritated bladder, predisposing the patient to void involuntarily (nocturnal enuresis). Moreover, it is observed that the bladder capacity during sleep is significantly smaller than the daytime capacity. Yeung et al. comparing the diurnal and nocturnal bladder capacity in patients with bed-wetting observed a reduction in nocturnal functional bladder capacity which appeared to be a common factor for nocturnal enuresis [10]. Recent literature review [11] confirmed correlations between neurogenic bladder disorders and intervertebral disc disease. Approximately 40% of patients with lumbar disc disease have abnormal urodynamic testing. An underactive or overactive bladder detrusor muscle was commonly found in patients with CMS [11].

For patients with monosymptomatic nocturnal enuresis, however, a specific etiology cannot be determined. Management then involves supportive approaches, including conditioning treatment (urine pad alarm) or medications (imipramine or desmopressin

acetate). Bladder-stretching exercises to increase functional bladder capacity have been used without consistent evidence of effectiveness. Although positive results were reported [12-14], the role of chiropractic for monosymptomatic enuresis has not yet been established. This case reveals a plausible link between monosymptomatic enuresis and CMS caused by disc herniation. Herniated disc disease is an often overlooked cause of enuresis. In the absence of severe myelopathy, symptomatic disc herniation itself is encouraged to adopt non-surgical treatments and regular monitoring rather than to anticipate surgical treatment, even in the case of a large lesion [4]. It has been observed that resolution of radicular pain and regression of herniated disc can be obtained from chiropractic care [15].

ORCID iD

Eric Chun Pu Chu  <https://orcid.org/0000-0002-0893-556X>.

COMPETING INTERESTS

The authors have no competing interests to declare.

FUNDING

The authors received no financial support for the research, authorship, and/or publication of this article.

CONSENT

A copy of the written consent is available for review by the Editor-in-Chief of this journal.

REFERENCES

1. Von Gontard A, Cardozo L, Rantell A, Djurhuus JC. Adolescents with nocturnal enuresis and daytime urinary incontinence— How can pediatric and adult care be improved—ICI-RS 2015. *Neurourol Urodynam* 2017;36:843–849.
2. Adam A, Claassen F, Coovadia A, et al. The South African guidelines on enuresis-2017. *Afr J Urol* 2018;24(1):1-13.
3. Selvaraj PR, Thirumalai R. Late adolescent primary nocturnal enuresis: a case report. *Int J Res Med Sci* 2017;5(11):5075-5078.
4. Brauge D, Madkouri R, Clement R, et al. What are the possibilities of spontaneous resorption of a thoracic disc herniation occupying more than 20% of

- the spinal canal in the asymptomatic subject? Comparative study. *J Clin Neurosci* 2017; 44:269-273.
5. Shah A, Botchu R, Grainger MF, et al. Acute symptomatic calcific discitis in adults: a case report and review of literature. *Skeletal Radiol* 2015;44(12):1819–1824.
 6. Inoue T. Pure conus medullaris syndrome without lower extremity involvement caused by intradural disc herniation at L1/2: a case report. *Spine Surg Relat Res* 2019;3:392–395.
 7. Nene Y, Jilani TN. Neuroanatomy, conus medullaris. In: StatPearls, Internet. Treasure Island, FL: StatPearls Publishing; 2020 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK545227/>.
 8. Brouwers E, van de Meent H, Curt A, et al. Definitions of traumatic conus medullaris and cauda equina syndrome: a systematic literature review. *Spinal Cord* 2017;55:886–890.
 9. Rider IS, Marra EM. Cauda equina and conus medullaris syndromes. In: StatPearls, Internet. Treasure Island, FL: StatPearls Publishing; 2020 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK537200/>.
 10. Yeung CK, Sit FK, To LK, et al. Reduction in nocturnal functional bladder capacity is a common factor in the pathogenesis of refractory nocturnal enuresis. *BJU Int* 2002;90(3):302–307.
 11. Siracusa G, Sparacino A, Lentini VL. Neurogenic bladder and disc disease: a brief review. *Curr Med Res Opin* 2013;29(8):1025–1031.
 12. Reed WR, Beavers S, Reddy SK, Kern G. Chiropractic management of primary nocturnal enuresis. *J Manipulative Physiol Ther* 1994;17:596–600.
 13. van Poecke AJ, Cunliffe C. Chiropractic treatment for primary nocturnal enuresis: a case series 33 consecutive patients. *J Manipulative Physiol Ther* 2009; 32:675–81.
 14. Instebø E, Lystad RP. Chiropractic care of an 8-year-old girl with nonorganic, primary nocturnal enuresis: a case report. *J Chiropr Med* 2016;15:47–52.
 15. Chu ECP, Chakkaravarthy DM, Lo FS, Bhaumik A. Regression of lumbar disc herniation following nonsurgical treatment. *Eur J Mol Clin Med* 2020;7(1): 27–29.

Legends

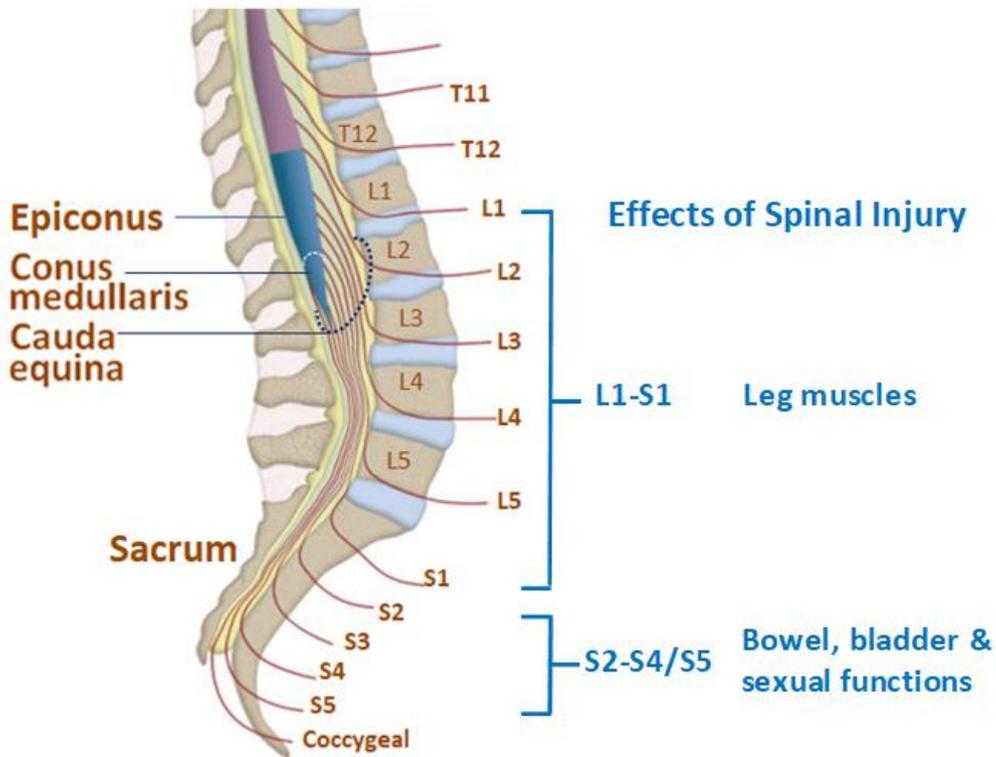


Figure 1. Schematic drawing of the lumbosacral spinal cord. On an average, the conus terminates at the L1 vertebra but can be located as high as the middle T11 level or as low as the middle L3 level. In pure conus medullaris syndrome, the neurological deficit is mainly restricted to bladder, bowel and sexual dysfunctions without lower limbs weakness.