

# Perioperative Pain Assessment in a 14-Year-Old Boy with Lumbar Disc Herniation

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## ABSTRACT

This case report illustrates the value of a comprehensive perioperative pain assessment composed of quantitative sensory testing and self-reported measures that highlight the impact of pain experienced by a 14-year-old boy suffering from chronic low back pain and sciatica. Before surgery, the pain assessment revealed inefficient endogenous inhibitory pain control with presence of temporal summation of pain. The severe pain was constant and lasted for 18 months. The patient was in a high-anxiety state, and reported significant functional disability and poor sleep quality. Six months after surgery, the patient was pain free. Quantitative sensory testing showed an improvement in his inhibitory pain control with

the absence of temporal summation of pain. The patient was no longer anxious, was back to normal functional abilities, and reported good sleep quality. By including neurophysiology and other pain measures, the clinical application of a comprehensive pain assessment can provide objective measurements of treatment efficacy. *J Pediatr Health Care.* (2018) ■■, ■■-■■.

## KEY WORDS

Chronic pain, pain assessment, quantitative sensory testing, surgery

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## INTRODUCTION

*Chronic pain* was originally recognized as pain that persists beyond the normal healing time and that lasts for more than 3 to 6 months (Merskey, 1994) and was recognized as a pattern of persistent pain associated with physical or psychological causes that may be compounded with behavioral changes (Steingrimsdóttir, Landmark, Macfarlane, & Nielsen, 2017; Treede et al., 2015). It is estimated that 25% of children and adolescents younger than 18 years suffer from chronic pain (Perquin et al., 2000), of which musculoskeletal pain made up the largest proportion (Groenewald, Essner, Wright, Fesinmeyer, & Palermo, 2014).

Lumbar disc herniation (LDH) is a common disorder during adulthood. However, its occurrence in childhood and adolescence is much less frequent. A Finish longitudinal study showed a 0% incidence of disc herniation in children until the age of 15 years, and it rose to 0.2% by 20 years and 4.5% by the age of 28 years (Zitting, Rantakallio, & Vanharanta, 1998). It is generally accepted that surgical management is better than conservative treatment in children and adolescents. A literature review showed that short- and long-term success rates were on the order of 25% to 50%

success for conservative treatment (Dang & Liu, 2010), which consisted of short periods of rest, analgesic and anti-inflammatory agents, physical therapy, and alteration of physical activities (Albright, Pollack, & Adelson, 1999; Slotkin, Mislow, Day, & Proctor, 2007). In contrast, the success rate of surgical management in the short term and long term are 95% and 78%, respectively. Nevertheless, just like in adults, conservative treatment is the first-line treatment as long as no weakness is noted. Children and adolescents are too often treated with conservative pain treatment on a trial-and-error basis, which increases the risk of disability due to pain while waiting to find the appropriate pain relief (Fisher, Law, Palermo, & Eccleston, 2014; Lynch et al., 2008). A prolonged waiting period increases the risk of diminished quality of life, school avoidance, anxiety, depression, reduced social life, and poor quality of sleep (Rathleff, Roos, Olesen, & Rasmussen, 2013; Tham et al., 2016).

Quantitative sensory testing (QST) is a recognized way to evaluate the endogenous pain modulatory system—the body's own ability to regulate different mechanisms of pain signals (Tham et al., 2016). QST incorporates cutaneous mechanical and thermal procedures that provide reproducible quantitative evidence of pain transduction and modulation and the patient's perception and expectation of pain (Goffaux et al., 2008; Lindbäck et al., 2017). However, results vary considerably according to the age and sex of patients, as well as the tested body area (Blankenburg et al., 2010; Hirschfeld et al., 2012). Although an interest in QST in pediatrics has grown in recent years (Lewandowski Holley, Wilson, Cho, & Palermo, 2017; Meier, Berde, DiCanzio, Zurakowski, & Sethna, 2001), the use of QST as a surgical outcome measure remains uncommon.

This case report highlights the value of undertaking a comprehensive perioperative pain assessment in patients suffering from chronic pain to better illustrate and quantify the multifactorial impact chronic pain has on the nervous system. Treated at the spine clinic of our organization, this child benefited from a simple surgical procedure that finally relieved him of severe pain after several months of unsuccessful conservative medical treatments. The identification of the underlying neurophysiologic and psychological functioning provides an overview of his pain experience before and after surgery.

## CASE PRESENTATION

A 14-year-old boy presented to the outpatient clinic with an 18-month history of severe back and leg pain after a soccer injury. The patient's history and physi-

cal examination results were consistent with an LDH, a resulting right S1 radiculopathy with hyperesthesia along the S1 dermatome, and a positive straight leg raise at 30°. Complaints of axial low back pain increasingly limited his abilities to perform daily tasks such as going to school and sitting for long hours. Magnetic resonance imaging confirmed the diagnosis of a paracentral L5/S1 disc herniation that was compressing the S1 nerve root. The adolescent had been treated with multiple measures such as physiotherapy, non-steroidal anti-inflammatory drugs, neuroleptics (pregabalin), nerve blocks with cortisone injections, and a short trial of opioids (hydromorphone). Despite treatment failures, the patient remained reluctant to proceed with surgical intervention. After an additional 3 months of conservative treatment, he agreed to surgical management. The patient underwent an uneventful same-day surgery consisting of a micro lumbar discectomy with a unilateral foraminotomy that ensured adequate decompression of the right L5 and S1 nerve roots.

One week before the scheduled surgery, and after the patient consented to participate in a research study on chronic pain, the research team performed a comprehensive pain assessment with QST and self-reported measures. An interview was conducted to identify the pain location, intensity, duration, and frequency. The patient reported experiencing severe pain over the last month and affirmed having back pain at rest and during movement. Lying down would occasionally alleviate his pain. His constant back pain radiated down his right leg for over 18 months and frequently arose multiple times a day, depending on the movements he made. The worst pain occurred when sitting. He denied having pain elsewhere other than his back. QST was performed on the most painful site of the patient's back. Testing was also done on his left forearm as a control non-painful site. The patient was tested for presence of dynamic mechanical allodynia (pain resulting from a non-painful stimulus that would not normally provoke pain) with von Frey filaments and for pressure pain with the use of an algometer. A thermal conditioned pain modulation (CPM) paradigm previously reported (Potvin & Marchand, 2016) was used to assess the patient's endogenous inhibitory pain control efficiency and to identify presence of temporal summation of pain—constant painful stimuli of same intensity. Part of the comprehensive perioperative assessment also consisted of validated questionnaires (Douleur Neuropathique 4 (Julien-Marsollier et al., 2017), the Revised Children's Anxiety and Depression Scale (Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000), the Functional Disability Index (Walker & Greene, 1991), and the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989; de la Vega et al., 2015)). These self-reported measures indicate presence of neuropathic pain, symptoms of anxiety, severity of functional disability, and sleep quality, respec-

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