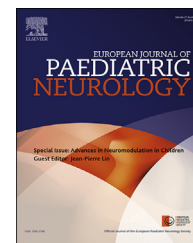




Official Journal of the European Paediatric Neurology Society



## Review article

# Current experience of spinal neuromodulation in chronic pain: Is there a role in children and young people?



David Pang

Pain Management and Neuromodulation Centre, St Thomas' Hospital, Westminster Bridge Road, London SE1 7EH, UK

## A B S T R A C T

## Keywords:

Neuromodulation  
Spine  
Pain  
Stimulation

**Introduction:** Chronic pain in children has been an under-recognized problem compared to adult pain. The aim of management is to help children and their families cope with the symptoms rather than a cure. Current medical treatments to reduce pain intensity are often short lived, poorly tolerated or ineffective.

**Results:** The use of electrical stimulation to treat pain is the current basis of modern Neuromodulation at the spinal cord and has been well established as spinal cord stimulation in adult practice. This involves placement of an epidural electrode connected to a subcutaneous implanted pulse generator. The electrode generates an electrical field at the dorsal columns of the spinal cord that inhibits pain pathways. Randomised controlled trials have demonstrated efficacy in neuropathic pain states such as the failed back surgery syndrome and complex regional pain syndrome.

**Conclusion:** Despite its initial expense, Spinal cord stimulation is a cost effective therapy in the long term and has the advantages of being a minimally invasive therapy and reversible.

Crown Copyright © 2016 Published by Elsevier Ltd on behalf of European Paediatric Neurology Society. All rights reserved.

## Contents

1. Introduction .....	57
2. Neuropathic pain in children .....	57
3. The use of neuromodulation for neuropathic pain .....	57
4. The gate theory of pain .....	58
5. Current status of neuromodulation at the spine for chronic pain .....	58
6. Mechanisms of action of spinal cord stimulation .....	58
7. Procedure .....	59
8. Complications .....	60
9. Indications and clinical evidence .....	61

E-mail addresses: [dcspang@gmail.com](mailto:dcspang@gmail.com), [davidpang@hotmail.co.uk](mailto:davidpang@hotmail.co.uk).

<http://dx.doi.org/10.1016/j.ejpn.2016.07.001>

1090-3798/Crown Copyright © 2016 Published by Elsevier Ltd on behalf of European Paediatric Neurology Society. All rights reserved.

10. Clinical evidence .....	62
10.1. Failed back surgery syndrome .....	62
10.2. Complex regional pain syndrome .....	62
11. Spinal cord stimulation in children .....	62
12. Future advances .....	62
12.1. MRI compatibility .....	63
12.2. High frequency and non-parasthesia stimulation .....	63
12.3. Dorsal root ganglion stimulation .....	63
12.4. Wireless stimulation .....	64
13. Conclusion .....	64
Conflict of interest .....	65
References .....	65

## 1. Introduction

Reports of chronic pain have shown that this common problem has a substantial impact on quality of life, physical, psychological and social function. It affects 20% of the adult population in Europe and is becoming recognized as a disease in its own right.<sup>1–5</sup> Yet, this debilitating and often refractory medical condition has only been recently studied in children.<sup>6</sup> In comparison, adult chronic pain is well recognized with established management and pathways but this is not the case in children despite the long-term morbidity that arises without adequate treatment.

In 2000 a cross sectional study of 5424 children from 0–18 years showed that 54% had pain within the previous 3 months. 25% complained of pain over at least 3 months.<sup>7</sup> This has led to estimates of 480,000 cases of severe chronic pain in adolescents per year in the UK and economic estimates of £3840 million per year.<sup>8</sup> A cluster sample of children and adolescents in Norway showed a prevalence of chronic pain of 21% with significant impact on psychosocial function.<sup>9</sup> A study in Germany showed a point prevalence of chronic pain in 10–14 year olds of 46%.<sup>10</sup> Yet a Canadian cohort reported the prevalence as 6%.<sup>11</sup>

Unsurprisingly, the types of pain encountered are variable and a systematic review yielded inconsistent results.<sup>12</sup> This is likely a reflection on the lack of standardization in chronic pain measurement and inconsistencies between epidemiological studies (Table 1).

Few chronic pain syndromes are amenable to a cure and the aim of management is in finding strategies to help the child and the family cope and manage their symptoms. Pharmacotherapy is commonly used but it is often limited by long term tolerance, lack of efficacy and side effects. Physical and psychological therapies aim to minimize the functional impairment that is associated with chronic pain but its effect on reducing pain intensity is modest.<sup>13,14</sup>

Of these pain syndromes, one of the most difficult types of pain is neuropathic pain. This is defined by the IASP as “Pain caused by a lesion or disease of the somatosensory nervous system”.<sup>15,16</sup> This particular type of pain is associated with greater morbidity and it is often refractory to medical management.<sup>16,17</sup> Examples of neuropathic pain are the burning symptoms associated with peripheral neuropathies or the sharp electrical shooting sensations found in nerve injury. These pains are often hard to describe and maladaptive.

## 2. Neuropathic pain in children

The prevalence of neuropathic pain has not been well studied in children compared to adults and common causes are listed in Table 2.

The causes of neuropathic pain in children differ from that seen in adults. It is rare in children less than 6 years of age and the median age of onset is 13 years old.<sup>18</sup> Conditions seen in adults such as trigeminal neuralgia, post herpetic neuralgia and painful diabetic neuropathy are uncommon in children. Despite the prevalence being poorly studied, it is becoming increasingly recognized in children with age related differences in both clinical manifestations and long term prognosis.<sup>19</sup> For example, younger children are less susceptible to chronic pain from nerve injury, a possible mechanism being the relative immaturity of the nervous system and differences in neuroimmune profile pre and post adolescence.<sup>20,21</sup>

Analgesic medications used to treat neuropathic pain in children follows the practice seen in adults. Drugs such as paracetamol, NSAIDs and opioids have poor efficacy in neuropathic pain. Anti-neuropathic analgesic drugs used are tricyclic antidepressants and gabapentinoids. Evidence demonstrating long term efficacy is lacking and side effects are often associated with long term morbidity.<sup>22</sup>

**Table 1 – Prevalence of chronic pain by diagnosis.**

Headache	8–82.9%
Abdominal	3.8–53.4
Back	13.5–24%
Limb	3.9–40%
Generalized	3.6–48.8%
Other	5–88%

## 3. The use of neuromodulation for neuropathic pain

The difficulty in managing chronic neuropathic pain in adults has led to increasing interest in the use of Neuromodulation. Its use for the treatment of chronic pain has predominantly focused on targeting nociceptive pathways in the nervous

Download English Version:

<https://daneshyari.com/en/article/5628918>

Download Persian Version:

<https://daneshyari.com/article/5628918>

[Daneshyari.com](https://daneshyari.com)