

**CHIROPRACTIC LUMBAR SPINAL MANIPULATIONS AND RISKS OF  
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**ABSTRACT**

Almost half of the population experience low-back pain at some point in time. Recently, the use of chiropractic which is a form of complementary medicine based on the manipulative treatment of the joints, especially those of the spinal column have increased considerably for such complaints. In spite of its increasing popularity, safety has been debated and estimates vary widely for the incidence of serious adverse reactions of chiropractic spinal manipulations. Neurological incidents account for the criticism surrounding chiropractic lumbar spinal manipulations. The aim of this review is to investigate the risk of the neurological complications of chiropractic lumbar spinal manipulations.

**KEYWORDS:** chiropractic, complementary medicine, complication, safety, lumbar spinal manipulation.**INTRODUCTION**

Low back pain (LBP) is a very common problem and a major cause of disability. The 2010 Global Burden of Disease Study estimated that LBP is among the top 10 diseases and injuries that account for the highest number of Disability-Adjusted Life Years worldwide.<sup>[1]</sup> The lifetime prevalence of LBP is estimated at about 50-70% in the developed countries.<sup>[2]</sup>

Chiropractic is a system of complementary medicine concerned with the diagnosis, treatment and prevention of disorders of the neuromusculoskeletal system and the effects of these disorders on general health.<sup>[3]</sup> There is an emphasis on manual techniques including joint manipulation with a particular focus on subluxations.<sup>[4]</sup> It is the introduction of a high velocity and low amplitude thrust into a joint and almost synonymous with Grade V mobilization.<sup>[5]</sup> Chiropractic manipulation gained mainstream recognition in the 1960s, and today it is a very popular treatment choice especially for LBP.<sup>[6]</sup> Chiropractic in general is considered as relatively safe when employed appropriately, but adverse events can arise as with all therapeutic interventions.<sup>[7]</sup>

Between 2-5% of patients seeking help for LBP patients are thought to suffer from a disk herniation.<sup>[8]</sup> Conservative treatment of LBP by medical doctors usually does not include chiropractic lumbar spinal manipulation (CLSM).<sup>[9]</sup> On the other hand,

chiropractors commonly treat LBP with CLSM and a number of case studies show that to be effective in the treatment of LBP even if there is lumbar disc herniation.<sup>[10]</sup> However, various neurological accidents have been responsible for the major criticism of chiropractic manipulation of the lumbar spine in the literature.<sup>[11-12]</sup>

In this review we aim to search the literature on safety issues of CLSM, in particular, the risk of serious neurological complications and their predictability. On the bases of relevant literature, we attempted to enlighten further understanding on the major risks associated with CLSM, the most frequently reported neurological complications and their prevention.

**METHOD**

Relevant surveys, review articles and case reports were identified using a comprehensive search of online databases. There were no restrictions as to the language of publication.

**RESULTS**

In the literature of the last forty years, estimates vary widely regarding the incidences of complications involving CLSM, such as lumbar disk herniation (LDH) and cauda equina syndrome (CES).

In one of the earliest of these studies, Evans et al (1978) found two of 32 patients over 3 week treatment, showed mild aggravation of symptoms.<sup>[13]</sup> In a later prospective study on CLSM of more than 2800 treatments for LBP, Kirkaldy-Willis and Cassidy (1985) found no patients got worse.<sup>[14]</sup> Afterwards, a prospective evaluation of 2000 patients by Nyiendo and Haldeman (1987) did not report any major complication.<sup>[15]</sup> In the same year, a stratified controlled trial of manipulation for LBP, Hadler et al (1987) showed that none of the 26 patients in the manipulation group deteriorated after the treatment.<sup>[16]</sup>

Patijn (1991) reviewed the literature and according to his data, there is a risk of one LDH in more than 8 million CLSM and one CES in more than 4 million CLSM.<sup>[17]</sup> Shortly after that, according to data found by Haldeman and Rubinstein (1992), estimates of the risk of causing LDH or CES with CLSM range from one in 1 million to one in over 100 million. If manipulation under anesthesia which is not matching to common chiropractic treatments is excluded, the risk is about one CES in 286 million CLSM.<sup>[18]</sup> Shekelle et al (1992) estimated the rate of occurrence of CES as an adverse event of CLSM to be about one per 100 million manipulations.<sup>[19]</sup> Michaeli (1993) surveyed 153 practitioners in South Africa who reported one minor or transient complication per 38,137 CLSM.<sup>[20]</sup> According to Stern et al (1995), the risk of complication of CLSM for patients with LBP and sciatica was not more than 5%.<sup>[8]</sup> Shortly thereafter, a meta-analysis by Assendelft et al (1996), comparing the effectiveness of CLSM with other therapies for LBP patients with LDH, concluded that CLSM was neither more nor less effective than other kinds of conservative care.<sup>[11]</sup> They also estimated the incidence of CES to be less than one per 1 million CLSM.<sup>[11]</sup> Senstad et al (1997) performed a prospective study of more than 1000 patients and found no permanent complications.<sup>[21]</sup>

Barrett and Breen (2000) prospectively studied 68 patients and found no serious adverse effects reported.<sup>[22]</sup> Oliphant (2004) evaluated the safety and incidence of complications of CLSM and showed that an estimate of the risk of CLSM causing a clinically deteriorated LDH or CES in a patient presenting with LDH is calculated from published data to be less than one in 3.7 million.<sup>[23]</sup> A systematic review by Luijsterburg et al (2007) evaluating the effectiveness of conservative treatments for patients with lumbar radiculopathy stated that no conclusion could be drawn whether physical therapy, medication, bed rest, or manipulation should be prescribed.<sup>[24]</sup>

## DISCUSSION

LDH and CES are the leading causes of claims against CLSM.<sup>[11,12]</sup> CES is the most serious complication of LDH. It has been recognized as an adverse event of physical procedures performed on patients affected by LBP or LHD. Although there is not an unquestionable evidence, it has been suggested that CLSM may play a

negative role, causing mobilization and extrusion of LDH with subsequent acute onset of radiculopathy.<sup>[25]</sup>

CES is a well-known neurological problem caused by compression of the lumbosacral nerve roots in the lumbar vertebral canal.<sup>[25-26]</sup> It consists of neurogenic bowel and bladder disturbances, saddle anesthesia, bilateral leg weakness and sensory changes.<sup>[25-26]</sup> It has been reported to occur in 1-16% of all reported cases of LDH.<sup>[26]</sup> CES represents a surgical emergency and CLSM is contraindicated in the presence of CES.<sup>[27]</sup> Early diagnosis followed by appropriate surgery and rehabilitation are the essentials of best practice in the treatment of CES.<sup>[28]</sup> The main assumption is that the mechanical compression of the lumbar roots and the ischemic damage to the spinal cord or to the cauda equina.<sup>[29]</sup> It is due to the massive compression of the lumbar roots expended by a large LDH which is intensely expelled during spinal manipulation or, less frequently, by an epidural hematoma which results from the traumatic rupture of a blood vessel.<sup>[30]</sup>

According to WHO guidelines LDH is not in the list of the absolute contraindication to CLSM while the presence of an acute CES represents an absolute contraindication to CLSM.<sup>[7]</sup> There have been case reports of CES observed in which an association between CLSM and the onset of the CES is suggested.<sup>[25]</sup> However, some authors have questioned about that attribution, suggesting that lack of evidence of a clear relationship between CLSM and the onset of CES symptoms does not allow for the distinction between iatrogenic damage and the natural evolution of the underlying disease; hence some cases of CES reported in the literature might have been incorrectly attributed to CLSM.<sup>[11,31-33]</sup>

The safety of CLSM in the treatment of LDH should be compared with other commonly accepted treatments for the same condition. Significant complications occur in 1-4% of NSAID using patients.<sup>[34]</sup> It has been shown that the risk of CES in surgically treated LDH patients was about 0.5%.<sup>[35]</sup>

Magnetic resonance imaging (MRI) is not accepted as a must for LBP patients before conservative treatments such as CLSM.<sup>[36]</sup> However, it is useful to be able to compare the outcomes of patients undergoing procedures if it is done before and after the treatment. There are not many studies available comparing MRI outcomes of LDH patients receiving CLSM. BenEliyahu prospectively investigated the effect of chiropractic treatment on MRI-confirmed LDH and none of the patients deteriorated.<sup>[37]</sup> Peterson et al compared improvement of patients with symptomatic, MRI-confirmed, LDH treated with either CLSM or nerve root injections (NRI). They showed that most CLSM and NRI patients with radicular LBP and MRI-confirmed LDH matching symptomatic presentation reported significant and clinically relevant reduction in self-reported pain level and increased global perception of improvement.<sup>[38]</sup>

Estimated prevalence of symptomatic LDH are as high as 4.8%, whereas MRI–confirmed LDHs are seen in 28% of asymptomatic people younger than 60 years.<sup>[38,39]</sup> After evaluating patients with LBP and leg pain due to MRI–confirmed LDH who were treated with CLSM in terms of their short-, medium- and long-term outcomes of self-reported global impression of change and pain levels at various time points up to 1 year and to determine if outcomes differ between acute and chronic patients using a prospective, cohort design, it was also reported that a large percentage of acute and importantly chronic LDH patients treated with CLSM showed clinically relevant improvement.<sup>[40]</sup>

## CONCLUSION

In the literature, estimates vary widely regarding the neurological complications of CLSM, such as LDH and CES. Even in patients presenting with LDH, the risk of CLSM appears minimal, especially compared with other common treatments for LDH, such as NSAIDs and surgery. However, all patients suffering from LBP, especially the ones with LDH should be clearly informed about the potential complications of CLSM, although they are rare.

All chiropractic treatments need a full medical history, diagnosis and plan of management. Chiropractic practitioners must rule out contraindications to CLSM, including adverse events and information should be collected to determine a potential neurological cause of the problem.

Practitioner should present the evidence-based advantage of CLSM and define the specific indications for which the benefits outweigh the risk. The risk of neurological complications should be important for the decision of practitioner on whether to perform CLSM. They should be aware of the “absolute” contraindications, where any use of CLSM is inappropriate because it places the patient at undue risk. CES represents a surgical emergency and CLSM is absolutely contraindicated in the presence of CES. In the presence of the “relative” contraindication, treatment can be modified so that the patient is not at undue risk. In such a case, low-force and soft-tissue techniques are the treatments of choice, instead of the introduction of a high velocity and low amplitude thrust.

Significantly deteriorated signs in such patients necessitate further investigation. MRI is accepted as the most reliable method for diagnosing LDH and discovering any accompanying spinal cord pathologies. In case LDH is suspected, MRI should be performed. The specific CLSM is dependent upon whether the LDH is intraforaminal or paramedian according to the MRI. MRI should be assessed in all patients to identify the neurological pathology, especially for patients with sudden aggravated or new onset of symptoms after CLSM. Although MRI is not routinely indicated for LBP patients before CLSM, today the practitioners may

consider to require MRI, since its cost-effectivity is more reasonable than before.

The manipulative techniques used vary among chiropractors therefore standardization of CLSM regarding LDH is not easy. However, we need clinical guidelines that aim to determine the cause of symptoms potentially associated with LDH and also to identify patients at risk of complications from CLSM.

It is possible that there are significant numbers of practitioners who have not passed the speciality examinations required and who are also not members of the Chiropractic Associations. Therefore, it is unjust to assess the risk of CLSM as practised by qualified and well-experienced practitioners together with that associated with untrained ones.

This review has several limitations. Some relevant published articles might have been missed. High levels of under-reporting or recall bias might distort the overall picture generated. Some studies consist primarily of uncontrolled case series. In addition to the published studies, data from the insurance companies which insures chiropractic practitioners can be used as a good source of statistics.

Safety concern of CLSM for LBP patients is an important topic. There should be an emphasis on evidence-based care. We need objective data on the relationship between CLSM and neurological accidents. Therefore, population-based nested case-control studies are required to determine accurately the incidence of neurological complications following CLSM.

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