# High-Force Versus Low-Force Lumbar Traction in Acute Lumbar Sciatica Due to Disc Herniation: A Preliminary Randomized Trial

Marie-Eve Isner-Horobeti, MD, PhD,[a,b] Stéphane Pascal Dufour, PhD,[c] Michael Schaeffer, PhD,[c] Erik Sauleau, MD, PhD,[c] Philippe Vautravers, MD,[a] Jehan Lecocq, MD,[b] and Arnaud Dupeyron, MD, PhD[d]

## Abstract

**Objective:** This study compared the effects of high-force versus low-force lumbar traction in the treatment of acute lumbar sciatica secondary to disc herniation.

**Methods:** A randomized double blind trial was performed, and 17 subjects with acute lumbar sciatica secondary to disc herniation were assigned to high-force traction at 50% body weight (BW; LT50, n = 8) or low force traction at 10% BW (LT10, n = 9) for 10 sessions in 2 weeks. Radicular pain (visual analogue scale [VAS]), lumbo-pelvic-hip complex motion (finger-to-toe test), lumbar-spine mobility (Schöber-Macrae test), nerve root compression (straight-leg-raising test), disability (EIFEL score), drug consumption, and overall evaluation of each patient were measured at days 0, 7, 1, 4, and 28.

**Results:** Significant ($P < .05$) improvements were observed in the LT50 and LT10 groups, respectively, between day 0 and day 14 (end of treatment) for VAS (–44% and –36%), EIFEL score (–43% and –28%) and overall patient evaluation (+3.1 and +2.0 points). At that time, LT50 specifically improved in the finger-to-toe test (–42%), the straight-leg-raising test (+58), and drug consumption (–50%). No significant interaction effect (group-by-time) was revealed, and the effect of traction treatment was independent of the level of medication. During the 2-week follow-up at day 28, only the LT10 group improved ($P < .05$) in VAS (–52%) and EIFEL scores (–46%). During this period, no interaction effect (group-by-time) was identified, and the observed responses were independent of the level of medication.

**Conclusions:** For this preliminary study, patients with acute lumbar sciatica secondary to disc herniation who received 2 weeks of lumbar traction reported reduced radicular pain and functional impairment and improved well-being regardless of the traction force group to which they were assigned. The effects of the traction treatment were independent of the initial level of medication and appeared to be maintained at the 2-week follow-up. (J Manipulative Physiol Ther 2016;39:645-654)

**Key Indexing Terms:** *Sciatica; Back Pain; Intervertebral Disc Displacement; Neuropathic Pain*

## Introduction

Lumbar traction (LT) is routinely used on its own or in conjunction with other treatments for the management of lumbar sciatica.[1,2] Different modalities of LT have been proposed to create forces (continuous, intermittent, manual, or motorized tractions) in various medical indications (acute and/or chronic lumbago—with or without sciatica—secondary to arthritis of a posterior facet joint, and/or disc herniation) and with various outcome measures and duration of follow-up.[3,4]

Previous studies have emphasized the short-term efficacy of LTs in several indications, such as acute sciatica secondary to disc herniation,[5,6] or in some populations,

[a] Physical and Rehabilitation Medicine Department, University Institute of Rehabilitation-Clémenceau, Strasbourg University, Strasbourg, France.
[b] Fédération de Médecine Translationnelle de Strasbourg (FMTS), Strasbourg University, Strasbourg, France.
[c] Department of Biostatistics, Strasbourg University, Strasbourg, France.
[d] Fédération MPR, CHU Montpellier-Nîmes, France.
Corresponding author: Marie-Eve Isner-Horobeti, MD, PhD, Institut Universitaire de Réadaptation Clémenceau-Strasbourg, 45 boulevard Clémenceau, F-67000 Strasbourg, France. Tel: +33 3 88 21 16 39. (e-mail: *marie-eve.isner@chru-strasbourg.fr*).
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defined, for instance, by an increase in sciatic pain during leg extension movements.[7] More recently, the feasibility of and rationale for mechanical tractions in the management of low back pain has been underlined, emphasizing the importance of subgrouping to assess the effectiveness of LT interventions.[8]

The mechanisms of action of LTs seem to be both mechanical, through separation of the intervertebral motion segments[9-11] leading to a significant decrease in intradiscal pressure,[12-14] and neurophysiological, through the modulation of the pain pathways by analogy with spinal manipulations.[15] Despite these expected mechanical and/or neurologic mechanisms of action, there is currently no clear consensus regarding the amount of force to apply in LT interventions. In this context, comprehensive literature reviews report mainly conflicting or limited evidence to support the beneficial effect of LT versus sham or no treatment in patients with lumbar sciatica.[3,4] Moreover, limited evidence was also identified when assessing the effectiveness of high (≥50% body weight [BW]) versus low (≤20% BW) levels of LT. Taken together, these results are somewhat difficult to interpret, given the heterogeneity of levels, durations, and modalities of tractions; duration of treatment; and medical status of patients.[16-18]

The aim of our study was to compare the effect of two levels (high and low forces) of short-term LT on pain and functional tests of the lower limbs in a specific population of patients presenting with acute lumbar sciatica secondary to disc herniation. We hypothesized that in this particular medical condition, high-level LT might be more effective than low-level LT in decreasing the pain associated with acute sciatica.

## Methods

### Study Design

This double-blinded and randomized study was performed to compare high versus low level of LT. Outcome assessments were performed at baseline (day 0; D0), at day 7 (D7, middle of treatment), day 14 (D14, end of treatment), and day 28 (D28, after 2 weeks of follow-up).

### Participants

Patients were enrolled at the emergency department of the University Hospital Strasbourg (Strasbourg, France) between January 2002 and June 2005 and were followed up for 2 weeks after the end of the treatment. Inclusion criteria were lumbar sciatica of less than 6 weeks' duration secondary to disc herniation as confirmed by pain radiating down the leg along the distribution of the sciatic nerve and positive result of the straight-leg-raising test (SLRT). Nerve root compression was systematically confirmed by lumbar tomodensitometry in concordance with clinical observations. Exclusion criteria were symptoms that persisted for more than 6 weeks, signs of clinical neurologic deficit, lumbar sciatica not caused by disc herniation, and presence of abnormalities on lumbar tomodensitometry. Patients aged less than 18 years, pregnant women, patients on medical leave for more than 3 weeks at inclusion, and patients with history of lumbar surgery or previous LT therapy were also excluded.

Patients received oral and written information and signed the informed consent form before inclusion in the study. The following data were collected: medical history, drug treatments, and history of the current lumbar sciatica problem. General, clinical orthopedic, neurologic, and functional examinations completed the data collection process (Fig 1).

### Randomization and Double-Blinding Procedure

This study was approved by the Institutional Ethics Committee of the University Hospital Strasbourg (CPPRB HUS No. 2754; clinical trial registry number NCT02091791). All participants gave consent to being included in this study. The randomization sequence was concealed in consecutively numbered envelopes that were allocated once eligibility was determined. Only the physiotherapist who conducted the LT sessions was aware of the experimental group to which the patients were allocated. Both the investigators and the patients were blinded to the traction levels.

### LT Intervention

Patients received 10 LT sessions (5 per week for 2 weeks). They were all randomly oriented either in a high-level LT group (50% of BW, LT50) or in a low-level LT group (10% of BW, LT10).

Patients were asked to lie in dorsal decubitus on a traction table (Fig 2). The dorsal spine rested on the fixed part of the table, and the lumbar spine segment to be treated was positioned at the junction of the fixed and mobile parts of the table. The lower legs were raised and positioned on a stool, with the hips flexed at 60 degrees to place the lumbar spine in slight kyphosis (Fowler position) from the beginning. The lower harness was put around the iliac crests and the upper harness around the bottom of the rib cage. The distance between harnesses was as small as possible to enable application of the traction force to the smallest possible portion of the spine. The patient was able to activate a safety switch to stop the traction if discomfort or excessive pain was experienced. The traction force was progressively applied for 5 minutes, depending on the patient's degree of relaxation and acceptance, and subsequently maintained at the target level (LT50 or LT10) continuously for 20 minutes in both groups. At the end of the session, relaxation was done progressively for 5 minutes, and each patient was asked to rest in the supine position for 5 minutes before standing.

During the study period, patients could take their usual medications. However, only the following painkillers or