Original Article

Efficacy of prone lumbar traction on chronic discogenic low back pain and disability

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Objective: To compare the outcomes of prone and supine lumbar traction in patients with chronic discogenic low back pain.

Design: Prospective, randomized control trial.

Setting: Urban Physical Medicine and Rehabilitation clinic.

Participants: A total of 124 subjects with chronic low back pain (LBP) and evidence of a degenerative and/or herniated inter-vertebral disk at 1 or more levels of the lumbar spine, who have not our exclusion criteria.

Intervention: A 4-week course of lumbar traction, prone or supine in case and control groups consecutively, consisting of six 30-minute sessions every other days, followed by four 30-minute sessions every 3 days.

Main Outcome Measures: The numeric Visual pain rating scale and the Oswestry Disability Index (ODI) were completed at pre-intervention and discharge (within 2 weeks of the last visit).

Results: A total of 124 subjects completed the treatment protocol. We noted significant improvements for all post-intervention outcome scores when compared

with pre-intervention scores ($P<0.01$). Also found significant difference between 2 groups in favor of prone traction ($P<0.01$)

Conclusions: Traction applied in the prone position for 4 weeks was associated with improvements in pain intensity and ODI scores at discharge, in a sample of patients with activity limiting LBP. However, because we lacked a reasonable long time follow-up, we cannot imply a long lasting relationship between the traction and outcome, and a long time follow-up is suggested.

Key Words: Back pain; Decompression; Inter-vertebral disk;

Introduction

Low back pain originated from inter-vertebral discs is one of the most common problems for the medical profession, patients, employers and the insurance industry. Although many patients have a brief course with spontaneous recovery, a significant number of patients continue to experience symptoms. (1)

Surgical procedures utilizing conventional and percutaneous approaches are useful for decompression of intravertebral disc spaces in the management of low-back pain syndrome associated with lumbar disc herniation.(2)5,6 Surgery will continue to play an important role in the treatment of patients with low-back pain and sciatica associated with herniated discs and degenerative disc problems. However, for patients who are not candidates for surgery, a conservative approach for returning the patient to a functional level of activity is necessary. (2),7

Lumbar traction is among the oldest known treatments for low back pain (LBP).(4) lumbar traction in various

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forms has been used for centuries since Hippocrates, and continues to be used in today's clinical environment.(4,8,9) But some systematic reviews of literature,(10-13) and evidence- based guidelines12,13 have concluded that there are not enough evidence to support the conventional supine lumbar traction as an effective treatment for patients with LBP. (3)
Recently, a newly developed lumbar traction system, vertebral axial decompression is introduced (16), demonstrate a significant pressure decrement up to 100 mmHg (2) and has been gaining some popularity (3). During the traction applied with this method, the patient is prone, with no thoracic harness, on a table specifically designed to eliminate frictional resistance. This method provides distraction forces and rest periods through a pelvic harness while the patient stabilizes himself/herself by holding a hand grip.(3,16) prone position may reduces a patient's reflex spinal muscle contraction and allows distraction of the vertebrae, causing a subsequent symptom reduction.(3,16-18)

Material and Methods

A prospective randomized trial was conducted on One hundred twenty four patients with chronic discogenic low back pain since March 2007 to June 2008 in a university affiliated spine clinic in Tehran, Iran. Ethic approval was earned by Baghiatolah University Ethic committee.
Patient Selection: one hundred thirty seven patients who had inclusion criteria were recruited from neurosurgical and orthopedic clinics of Tehran. Three of them had following exclusion criteria. The others presented with a brief clarification of study and the intervention back bone. Ten patients did not accept the study and underwent routine conservative management and physical therapy in our clinic. finally one hundred twenty four patients entered the study in a fourteen months period of study .
Inclusion Criteria: Inclusion criteria were chronic low back pain which defined as more than three months back pain (19) and the disc origin of pain which cleared by clinical examination and correlate the symptoms, signs and clinical exams with magnetic resonance imaging (MRI), and can attend ten sessions of therapy as mentioned below.
Exclusion criteria: were osseous stenosis; unstable spine (bilateral pars defect or
Spondylo-listhesis of Grade II or greater); spinal surgical implants; spinal pain due to tumor, infection, or inflammatory diseases , pregnancy, Previous spinal surgery;
Formal therapeutic or medical intervention within the last three months (eg epidural injection, facet joint block, physiotherapy etc); Concomitant severe medical problem preventing participation in the trial (cardiac conditions, respiratory conditions, neurological disorder or organ disease); Long term oral steroid intake (due to the risk of osteoporosis) and History of major psychiatric illness;.
Research Design: The patients categorized in two groups in a simple consecutive randomization. A physiatrist was responsible for primary evaluation and inclusion, exclusion clarification and research coordination. A trained researcher was responsible for pre & post intervention evaluation and outcome measurement. He was blind to interventional groups. Two physical therapist was responsible for interventional groups separately and unaware of outcome evaluation results. And finally a statistician was responsible to analyze the results who was blind about interventions.
Intervention: Group one received fifteen minutes of trans-cutaneous electrical stimulation (TENS) with Hot pack (HP) and then fifteen minutes of prone traction and second group received fifteen minutes of HP and TENS and then fifteen minutes of traditional supine traction. The setting of traction was an intermittent hold for 30 seconds, then rest for 10 seconds. Totally 10 sessions of traction was applied during one month, 6 sessions every other day and 4 sessions every 3 days. The traction force was increased until the patient indicated that the tolerance for pulling was reached, with a minimum traction force of 35% and a maximum of 50% of the total body weight. The patient's position in supine group was in 90° hip flexion and 90° knee flexion.21 and in prone group was in 10° of hip flexion. HP was completely identical in both groups with one system and TENS was at the level of perception and tolerable with similar units. HP and TENS were applied as preparing for traction modalities. Traction was applied in ten sessions, every other day.
Measurements: A demographic sheet was prepared to record patient's information at the entrance of study. The severity of low back pain was measured using a visual analog scale (VAS) in the form of a ten score ruler from 0 (no pain) to 10 (unbearable pain). Oswestry Disability Questionnaire (ODQ) was used in the functional evaluation.ODQ is translated and validated in Farsi (20)

Statistical Analysis: All data analyses were done with SPSS statistical software (SPSS) and presented as mean value ± SD.

The clinical effect size used for the ODI was 10% [22], alpha was set at .05 and power at .80. Sample size was calculated at n = 62 for each of the two groups. This was calculated using $n = \frac{(Z_1-\alpha/2)^2 \times 2 \times S^2}{d^2}$

[22]. The clinically significant difference for the VAS ranges between 10 and 14 mm [22].

Results:

Participant characteristics are shown in Table 1. No statistically significant differences in age, sex ratio, BMI, or symptom duration were found between the 2 groups.

Table 1: Prone & Supine Groups Characteristics

	Mean		*Std Deviation*	
Variable	Prone(62)	Supine(N=62)	Prone(62)	Supine(N=62)
Age	43.74	43.69	12.21	14.49
Weight	80.82	76.42	9.02	10.37
Height	172.33	174.56	9.15	7.07
VAS1	6.55	6.03	1.79	2.26
VAS2	2.89	3.92	1.38	2.09
VAS2-VAS1	-3.66	-2.11	1.64	1.96
ODI 1	42.37	31.03	16.95	20.34
ODI2	21.96	20.52	14.47	17.15
ODI2-ODI1	-20.41	-10.52	11.82	12.21

Pre-intervention VAS was 6.03 and 6.55 in supine and prone groups respectively which has not significant difference. Pre intervention ODI was 31 and 42 in supine and prone group respectively. Post intervention VAS was 3.92 & 2.89 in supine & prone groups respectively, which has significant 2.11 & 3.66 Decrement in supine & in prone groups (P-value<0.0001), comparing to pre-intervention.

Post intervention ODI was 20.52 & 21.96 in supine & prone groups respectively, which has significant 10.52 & 20.41 Decrement in supine & in prone groups (P-value<0.0001), comparing to preintervention.

After confirming the equality of variances between two groups, VAS decrement (after intervention) in Supine & prone groups, has meaningful difference (P-value<0.0001) prominent in prone group. Figure1

Also After confirming the equality of variances between two groups, ODI decrement (after intervention) has meaningful difference (p<0.05) prominent in prone group. Figure 2

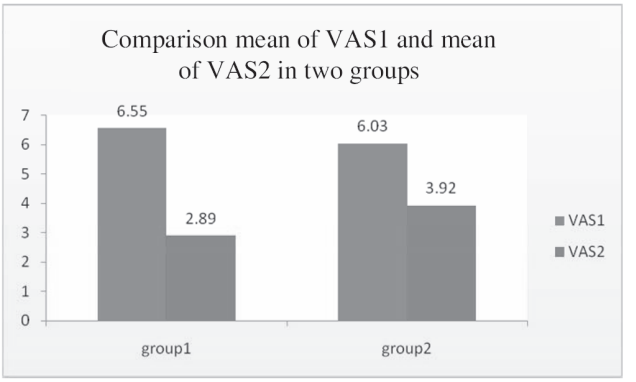

Figure 1

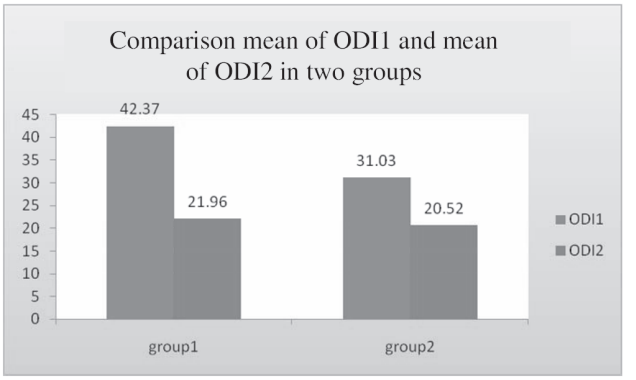

Figure 2

Discussion:

Although the spontaneous remission rate for acute discogenic low back is high. Unfortunately morbidity and disability waiting for spontaneous remission is also high. (23)

Disc metabolism is principally anaerobic, so Intra-discal pressures above end-plate capillary pressures may impede oxygen and nutrient diffusion to the avascular disc, thus limiting repair and healing. (1)

The lumbar traction represents a medical procedure with therapeutic effects on discogenic back pain which affects intra-discal pressure especially in above threshold loads (2). Traction also can affect metabolism of disc, facilitate the transfer of oxygen and nutrient into the disc, relieving irritation and compression on pain sensitive structures enhancing healing and repair.(1)

This prospective, longitudinal randomized trial provides preliminary information describing outcomes after traction with Patients reported significantly improved pain and ODI scores after 10 sessions of prone and some after supine traction at discharge.

Traction has the advantage of being non-invasive with a relatively low risk of injury to the patient. The prone traction applied in this study differs from most conventional lumbar traction in a variety of ways; the subject is positioned prone on a low-friction surface as opposed to supine on a high-friction surface; and a pelvic harness is used as opposed to a lumbar harness. Searching the Medline, we did not find any studies that provided direct comparison of outcomes of the prone traction with conventional forms of lumbar traction.

Our results suggest a generally favorable association between the prone traction and the outcome measures used in this study pre & post discharge and comparing to traditional supine method; and, it seems that prone traction has some superiority on traditional supine traction at least in early stages after treatment Figure1&2. Our results regarding prone traction are in the line with some other studies (1, 2, 3, 9, 10,11) but they lack comparison with traditional method and it is unique for our study. However, because we lacked a long time reasonable follow-up, we cannot imply a long lasting relationship between the traction and outcome, and a long time follow-up is suggested.

Acknowledgments

We acknowledge Mr. Pouria Rezasoltani. Msc, for Statistical Analysis of this study.

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