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The Effects of Lumbar Traction in Lumbar Discal Hernia. A Single Case Study

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Abstract

People have always had back pain. Back pain was described in the distant past in old texts from 1500 BC. The word sciatica has been used since Ancient Greek times and Hippocrates (460-370 BC) described "sciatic" pain as mainly affecting men aged 40-60 years (Allan and Waddell, 1989). This is a single case study about whereas the mechanical effects of lumbar traction are well substantiated. We have used the intermittent variable of the traction. We used a Platinum 3D traction table. MRI of the lumbar spine of the patient were recorded before and after. Pain intensity was rated on VAS, TSK questionnaire and SEC. Based on the findings of this single case, further study is needed to determine optimal treatment duration, frequency, and mode of administering lumbar traction. In this case there was a real change in the discs after the treatment with problems that were the fear of movement and of course the patient was experiencing the movement schemes that were connected with the pathology. Exercises are necessary to have a good situation for the everyday life. Horizontal traction was evidently effective in increasing the disc height of lower lumbar levels, particularly in the posterior regions of the discs. The situation of the hernia is really changed in in nearly 12-15 treatment sessions. A rehabilitation program cannot be seen as a stand-alone system, but as a hole and the scope is to have a full rehabilitation of the patient.

Keywords: Traction, Physiotherapy, Pain, Quality of Life

Introduction

People have always had back pain. Back pain was described in the distant past in old texts from 1500 BC. The word sciatica has been used since Ancient Greek times and Hippocrates (460-370 BC) described "sciatic" pain as mainly affecting men aged 40-60 years (Allan and Waddell, 1989). However, only in 1934 that Mixter and Barr (1934) described disc herniation as a cause of sciatica. Several other studies have shown that sciatica depends not only on mechanical nerve root compression, but also on biochemical factors (Brisby et al., 2000; Kayama et al., 1996; Olmarker et al., 1996, 1993).

Today, back pain is a common problem and a recent systematic review concludes that low back pain (LBP) continues to be a common problem at global level (Hoy et al., 2012). With ageing populations, the absolute number of people with LBP is likely to increase over the coming decades. According to the same review, the mean point prevalence was 18%, the one-year prevalence was 38% and the mean lifetime prevalence was 39% (Hoy et al., 2012). Nearly the same results were reported in a Swedish study (Björck-van Dijken et al., 2008), in which 41% of the participants reported LBP.

The disc is an avascular structure and contains a gelatinous nucleus pulpous, the surrounding fibrous zone, annulus fibrosus, and the vertebral endplates.

The disc is an absorber of load forces, mainly compressive loads, but it also absorbs tensile stresses during motions of flexion, extension and lateral flexion. Axial rotation of the torso causes torsional loads and shear stresses in the disc (White and Panjabi, 1978). The disc allows motion in all directions, but the direction of the facet joints restricts the motion in the segment.

The direction of the facet joints differs in the spine and, in the lumbar spine, mainly flexion and extension are possible.

In healthy young people, the water content in the nucleus is 80-90%. The water content decreases with age, mainly after the fourth decade of life (Adams and Roughley, 2006).

The mechanical load on the disc is particularly important for maintaining a healthy disc. On the other hand, prolonged exposure to hypo- or hyper physiological loading can damage the disc. The magnitude, frequency and duration of dynamic loading together determine the destiny of disc cells (Chan et al., 2011). It has been shown that hydrostatic pressure influences the intervertebral disc cell metabolism. Moreover, abnormal hydrostatic pressure may accelerate disc degeneration (Handa et al., 1997). The load applied to the disc is more complex than only compression and hydrostatic pressure; other physical factors and different types of mechanical load also affect disc cell behavior (Chan et al., 2011).

Lumbar traction is commonly used to treat patients with back pain. The mechanical effects of traction on the lumbar spine are well documented in the literature. Cyriax 1982, described three beneficial effects of traction: I) distraction to increase the intervertebral space, 2) tensing of the posterior longitudinal ligament to exert centripetal force at the back of the joint, and 3) suction to draw the protrusion toward the center of the joint.

Other effects attributed to traction include widening of the intervertebra1foramen (Saunders 1993), flattening of the lumbar lordosis (Cailliet 1988). and distraction of the epiphyseal joint (Coldish 1989).

Worden and Humphrey 1964 reasoned that if traction causes vertebral separation, then adequate force should result in an increase in body height.

Five healthy subjects received a maximum of 59.9 kg of traction up to 15 times over a 22 day period. Traction force was applied to the chin and thorax in the cephalad direction and to the pelvis

and ankles in the caudal direction, with the subjects positioned supine. Traction was administered for 60 minutes, with 1- to 3-minute rest periods every 1D minutes.
The authors reported 8-11.5 mm increases in standing height, with some retention of these height increases after several days of traction.
Twomey 1985 documented vertebral separation with traction by applying 9 kg of sustained traction to the spinal columns of 23 male cadavers. A significant increase in length of the lumbar columns was recorded. Eighty-five percent of the length increase occurred immediately after application of the traction, and 60% of the increase was due to vertebral separation. Spinal columns composed of healthy discs demonstrated greater vertebral separation than columns with signs of disc degeneration.
In another study investigating vertebral separation, Colachis and Strohm 1969 studied the effects of 22.7 and 45.4 kg of traction in 10 healthy subjects. They reported significant increases in total mean posterior vertebral separation with 22.7 kg of traction and increases in total mean anterior and posterior separation with a traction force of 45.4 kg.
The greatest increase in posterior vertebral separation occurred at the L4-5 level.
Several studies have used diagnostic imaging to document changes in disc herniation. Mathews 1968 administered epidural injection of contrast medium to 11 patients with sciatica and a limited straight-leg raise. Lateral radiographs were taken before, during, and after traction.
Radiographic findings included reduction of disc prolapse, vertebral separation, and flow of contrast material into the disc spaces. Gupta and Ramarao 1978 used epidurography to evaluate the effects of 10- 1 5 days of continuous 36.3-kg traction on prolapsed discs.

Purpose of the study

This is a single case study about whereas the mechanical effects of lumbar traction are well substantiated.
The failure to conclusively demonstrate the clinical benefit of lumbar traction may be related to the varied diagnostic categories and treatment techniques employed in the studies.

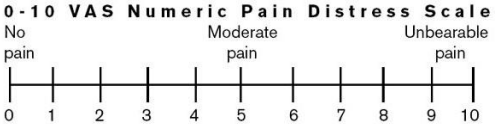
Methods

We have used the intermittent variable of the traction and mostly we have combined the change of the angle based on the hernias we were treating. We used a Platinum 3D traction table.
Magnetic Resonance Images of the lumbar spine of the patient were recorded before and after 30 min of horizontal lying and directly after 30 min of horizontal traction of 42% till 75 % of body weight in this case the body weight was 74.3 kg. The anterior, central, and posterior disc height and tilt angle of L4-L5 and L5-S1 lumbar disc was measured, the discal protrusion was measured in the same point before and after the traction procedure.

Lumbar disc	*Height before the treatment*	*Height after the treatment*	*Disc protrusion before*	*Disc protrusion after*
L4-L5	*1.28 cm*	*1.29*	*5.63 mm*	*3.28 mm*
L5-S1	*1.07 cm*	*1.26*	*8.81mm plus edema and extrusion portion*	*4.22 mm*

Pain

Pain intensity was rated on two Visual Analogue Scales (VAS) from 1/10



Physical findings

Physical findings are based on the MRI of the lumbar part.

The movement was evaluated

The Tampa Scale for Kinesiophobia (TSK) questionnaire

TSK questionnaire comprises 17 items assessing the subjective rating of Kinesiophobia. Each item has a 4-point Likert scale with scoring alternatives ranging from "strongly disagree" to "strongly agree". A total sum is calculated after inversion of the individual scores for items 4, 8, 12 and 16. The total score varies between 17 and 68. A high TSK value indicates a high degree of Kinesiophobia. Vlaeyen et al. (1995a) defined a cut-off of >37 as a high degree of Kinesiophobia.

Tampa Scale of Kinesiophobia (TSK)

Instructions:

In these days of high-tech medicine, one of the most important sources of information about you is often missing from your medical records: your own feeling or intuitions about what is happening with your body. We hope that the following information will help to fill that gap.

Please answer the following questions according to your true feelings, not according to what others think you should believe. Score each statement from strongly disagree to strong agree by tapping the appropriate box.

		Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
1	I'm afraid that I might injury myself if I exercise	1	2	3	4
2	If I were to try to overcome it, my pain would increase	1	2	3	4
3	My body is telling me I have something dangerously wrong	1	2	3	4
4	My pain would probably be relieved if I were to exercise	4	3	2	1
5	People aren't taking my medical condition seriously enough	1	2	3	4
6	My accident has put my body at risk for the rest of my life	1	2	3	4
7	Pain always means I have injured my body	1	2	3	4
8	Just because something aggravates my pain does not mean it is dangerous	4	3	2	1
9	I am afraid that I might injure myself accidentally	1	2	3	4
10	Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening	1	2	3	4
11	I wouldn't have this much pain if there weren't something potentially dangerous going on in my body	1	2	3	4
12	Although my condition is painful, I would be better off if I were physically active	4	3	2	1
13	Pain lets me know when to stop exercising so that I don't injure	1	2	3	4
14	It's really not safe for a person with a condition like mine to be physically active	1	2	3	4
15	I can't do all the things normal people do because it's too easy for me to get injured	1	2	3	4

Self-efficacy

The Self-Efficacy Scale (SES) consists of eight items assessing functional self-efficacy beliefs specifically related to various basic physical activities (Estlander et al., 1994). Each category is scored on an 8-point Likert scale whereby the patients estimate how long they believe they would be able to endure the activity, from less than 2 minutes to more than 45 minutes. The total score range is 8-64, with higher scores indicating more positive beliefs.

Discussion

The nucleus pulpous, sometimes the annulus fibrosus and material from the end plates can penetrate the annular tears and cause a bulging disc. A bulging disc can develop into a complete disc herniation. Herniation is defined as the localized displacement of disc material beyond the limits of the intervertebral disc space (Fardon and Milette, 2001).
One common classification of disc herniation involves distinguishing between protrusion, extrusion and sequestration (Fardon and Milette, 2001).
A disc herniation can cause the mechanical compression of a nerve root, which can lead to symptoms and leg pain in particular (Rydevik et al., 1984).
One aim of medical research is to produce evidence of the effects of treatment. When it comes to patients with disc herniation, there are problems measuring the effects of treatment, as natural healing is regarded as fairly extensive and is difficult to estimate. It has been shown that one third of the patients with sciatica recovered within two weeks and approximately 75% within three months (Vroomen et al., 2002). According to another study, 60% of the patients with disc herniation had recovered after three months and 70% after twelve months (Weber et al., 1993). With these results in mind and the guideline of waiting six to eight weeks before surgery is considered (Bono et al., 2006), the inclusion criterion for the present studies was set at six weeks in order to minimize the effect of natural healing.

1. Before the treatment

2. After the treatment

SES was of value of 35 (12–62) in the first visit. A significant improvement was seen in all outcome measurements at the four-month follow-up.
With pain scale from 8/10 in the begging to just 2/10 in the end of the treatment. TSK from 36 to 21 at the end of the treatment with a steady change in the better situation from one week to the other, and SES from 35 to 57 at the end of the treatment.

Typically, clinicians rely on expert opinion in making decisions about when and how to implement lumbar traction, so there is more research needed to begin making the decisions based on research.

Of the 10 types of lumbar traction described in the literature, static and intermittent mechanical traction are the two most commonly used. Indications, contraindications, and treatment techniques for these two types of traction are well known. Based on the findings of this single case, further study is needed to determine optimal treatment duration, frequency, and mode of administering lumbar traction. A classification system to identify patients most likely to benefit from traction need to be developed and validated.
It would probably save time for the patient to begin a structured physiotherapy treatment at an early stage, before an appointment is made with a surgeon.
When planning the treatment protocol for patients with lumbar disc herniation, it appears to be important to remember that many patients experience various degrees of fear of movement.
It is more recommended that a structured physiotherapy treatment model is being used for nine weeks before considering surgery, when patients report severe pain and disability due to lumbar disc herniation. It appears to be important to give the patients with severe pain the opportunity to obtain effective structured physiotherapy treatment at an early stage, rather than passively waiting for healing.
In this case there was a real change in the discs after the treatment with problems that were the fear of movement and of course the patient was experiencing the movement schemes that were connected with the pathology. So it was not enough for the patient the fact that the discs are better in the situation of the herniation but it was necessary to change the movement and the way the patient cope with different patterns of movement and tasks. So after the second MRI it was

necessary to make a lot of exercises and movement techniques to have a really good situation on the everyday life.

Conclusions

Horizontal traction was evidently effective in increasing the disc height of lower lumbar levels, particularly in the posterior regions of the discs. Further evidence of the effects of traction of different modes, magnitudes, and durations on the change in disc height is required for proper control of traction applied to specific disc levels. The situation of the hernia is really changed in in nearly 12-15 treatment sessions. The pain has decreased from 8/10 in 2/10. The exercise has been prescribed for the next 3 months for a better muscle situation and more equilibrium between lumbar and abdominal muscles. A rehabilitation program cannot be seen as a stand-alone system, but as a hole and the scope is to have a full rehabilitation of the patient.

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