Use of a New Traction-Flexion Devic in a Patient with Low Back Pain: A Case Study

David K. Leonard, BA
William E. Tuttle, DC
Mark Pfefer RN, MS, DC

Submit inquiries and galley proofs to:

David K. Leonard
11913 Armitage Dr
Grandview, MO 64030
(816) 965-9381 E-mail:
Doctorleonard-Jilcoent@juno.com

Support:
David K. Leonard
William E. Tuttle
Mark Pfefer
Cleveland Chiropractic College

Abstract

The use of a new traction-flexion device(Jilco Chair) is described for treatment of chronic low back pain. A 65-yr.-old male patient suffered from chronic back pain associated with degenerative joint disease (L5 spondylosis with disc narrowing and facet arthrosis). The Oswestry Low Back Pain Disability Questionnaire and the Visual Analog Scale were used as measurements of improved functional capacity and pain mitigation. The use of specialized traction-flexion combination exercises using the Jilco Chair protocol resulted in Oswestry reduction from 42% to 24%, reduction of pain by up to 50% (VAS), and improved range of motion within a three week period.

Key Indexing Terms: traction, flexion, passive mobility,

Introduction

Low back pain complaints account for a majority of presentations seen in a chiropractic office (1). The majority of low back pain can be attributed to either disc disruption, disc herniation, and facet arthrosis or involvement (2,3). Degenerative joint disease contributes to the pathology of the lumbar spine. Indeed, the L4 and L5 articulations are the most common locations for facet arthrosis and for disc degeneration (4). Numerous chiropractic and medical techniques have been used with various success to mitigate the associated symptoms of low back pain. Spinal traction and flexion exercises have been some of these treatments. This paper describes the use of a patented device that uses traction-flexion coupled with a passive motion to decrease low back pain. Pre and post range of motion following treatment was also investigated.

Traction was very popular in the early years of this century, but it fell into disrepute when more modern and sophisticated techniques were introduced. There is significant research, however, that examines the application of traction to decrease the pain associated with low

back complaints. In 1955 Judovich stated that pelvic traction with at least 26% of body weight had a stretch effect on the lumbar spine (5). Colachis and Strohm stated that lumbar traction was a successful treatment and has earned a reputation as a dependable therapy, specifically for ruptured intervertebral dics (6). Matthews studied the positive effects of lumbar traction in 1968 and 1972 (7,8). In the now classic study on traction, Saunders stated that correctly performed traction has the following effects: a) separation of the vertebral bodies; b) causes a combination distraction and gliding of the facet joints; c) tensing of the ligamentous structures of the spinal segment; d) widening of the intervertebral foramen; and e) stretching of the spinal musculature (9). Cyriax also recommended traction for low back pain (10). Harrison and Troyonovich have emphasized the use of traction and extension in their CBP protocol (11). Finally, Cox has used traction (distraction) combined with flexion on 1000 low back pain patients with positive results (12).

For many years the standard for low-back pain were Williams flexion exercise protocol. These exercises were performed in the supine position on a floor. There are variations, but the primary position is to grab the legs and pull the knees to the chest and hold for a few seconds. The patient then relaxes, drops the legs to the floor and repeats the exercise again. The primary benefit is opening of the intervertebral foramen, stretching of ligmentous structures, and distraction of the apopyhseal joints (13). Elnagger et al, showed that flexion helped mitigate back pain (14). Inufusa et al. demonstrated that flexion had the following effect: a) significantly increased the canal area, b) increased midsagittal diameter, c) increased subarticular sagittal diameter and d) increased all the foraminal dimensions significantly (15). Lastly, Cox has developed an entire protocol that successfully uses flexion and distraction to decrease back pain (12).

Clinical studies on the use of continuous passive motion has demonstrated the beneficial results to the articular cartilage and synovial complex (16-18). Although one of these studies (17) was done on the knee, inference can be made to similar processes occurring in all synovial joints such as athrosed facet joints associated with low back pain.

The clinical efficacy of traction, flexion and passive mobility have been investigated separately, but no study exists that shows the benefit of using all three of these treatments in combination. This study examines the use of a device (Jilco Chair) that combines traction, flexion and passive motion in a supine and non-weight bearing position. By using this combination exercise, the Jilco chair is able to a) separate the amphiarthrodial and diarthrodial joints in the lumbar region (9), b) produce flexion which is thought to cause the posterior longitudinal ligament and the posterior annular fibers to stretch and may push any herniated nuclear material back towards the center of the disc (19-33), and c) produce passive motion that creates imbibition which provides nourishment to the intervertebral discs and synovial joints (16-18).

Case Report

A white 65-yr.-old man suffered from low back pain. The patient's chief complaint

was an inability to stand for any length of time without pain that started in the low back area but then radiated down the leg. The patient had a 15-year history of chronic low back pain but during the last few months it had worsened to the point where it was seriously interfering with his daily activities. He was only able to obtain intermittent relief by stretching and by complete avoiding lifting objects greater than 30 lbs. He did seek previous medical attention during the 15-year history and was diagnosed with mechanical low back pain for which he was given anti-inflammatory and pain medication with palliative results. Approximately two years ago he had a course of osteopathic manipulation, with unremarkable results. The patient also performed a home exercise regimen and stated that " the exercises did not help." Some relief was obtained when he would bring his knees to his chest while on the floor. He was not on any prescription medication at time of exam but did use over the counter NSAIDS and analgesics. Physical and NMS exams revealed the following: blood pressure was 140/95, heart rate 90, respiration rate 15, The pain was localized to the L5-S1 region and occasionally in the buttocks. The pain worsened upon long periods of standing and with any sudden rotational motion but there was no pain radiating below the knee. Kemp's test was positive bilaterally, the straight leg raise test did recreate some sciatic pain, and Becterew's test was also positive revealing possible disc involvement. Range of motion tests demonstrated hypomobility, most notably during flexion and extension. The X-ray findings confirmed complete loss of disc space at L5-S1, and also revealed facet arthrosis at L3, 4, & 5 and general lumbar spondylosis.

Treatment Protocol

The Jilco chair resembles a recliner in appearance and can place the patient in various positions ranging from sitting to fully supine (see figure 1-2). Once in position, the torso is secured by means of a belt. Underarm supports then gently traction the spine until desired distraction is met (until patient feels stretch). The distractive force ranges from 100-700 ft.lbs. At this point the legs are raised toward the chest to initiate flexion. Through the use of moving parts, the chair cycles the user in a combination passive movement exercise involving simultaneous traction and flexion.

The treatment protocol was explained to the patient and informed consent was given to treat. He was checked for contraindications to treatment. This was determined by having him lay supine on floor and bringing knees to chest (this motion recreates

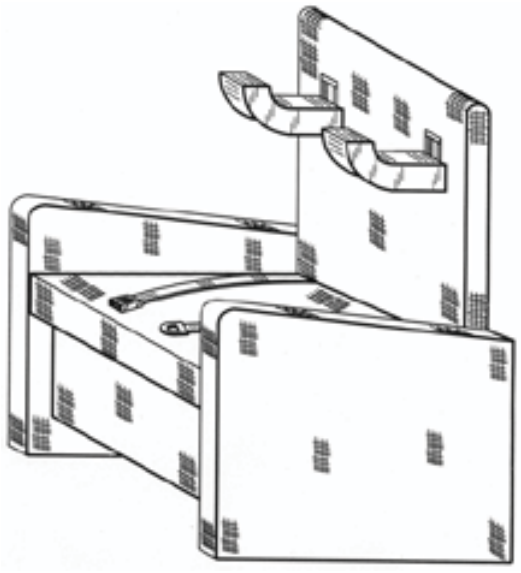
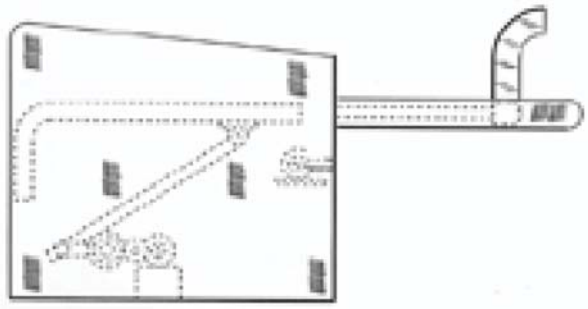


Figure 1. Jilco Chair

Figure 2. Schematic of the Jilco Chair



the passive action of the Jilco Chair). Any reproduction of pain or exacerbation of existing pain would be contraindication for the Jilco Chair protocol. After determining that no contraindications exist, a course of treatment of once a week for three weeks was initiated. With the patient nearly supine, traction was applied to the point where stretching occurred in the lumbosacral region. This distraction was verified by patient stretch to pre-pain tolerance and by palpation (feeling the separation of spinous processes). At this point the legs were raised up slowly to initiate further stretch in the lumbosacral region and complete a flexion motion. Raising the legs is completely controlled by the operator (physician). The legs are brought up slowly as the physician continually assesses the patient and checks for increased pain, as any exacerbation of pain would also be contraindicative of treatment continuing. When the legs reach the highest point the maximum tractioning and flexion effects are felt. When the legs are lowered, one cycle is then complete. Traction is maintained constant during the complete flexion cycle. The patient may feel a pulling and stretching sensation and at times this may be uncomfortable. If so, the amount of traction and flexion can be reduced by adjustments in the Jilco Chair. The rate of the cycle was adjusted so that six flexion cycles took place per minute. Each session lasted for a period of twenty minutes.

Discussion

Deyo reviewed the reliability and reproducibility of outcome measures used in low back pain and questionnaires proved to be more reliable than objective measures (22). This was also confirmed by Anderson and Meeker (23). Also, it is difficult to measure pain in the clinical setting because involving the patient in the process of measuring creates variability (24-26). However, by its very definition pain often eludes a rigorous analysis and the best we can do is to manage the high degree of variability in patient outcomes by understanding the attributes of such measures (27,28). For these reasons, we employed the use of a visual analog (VAS) pain scale and the Oswestry Low Back Pain Disability Questionnaire. The VAS has proven to be accurate and effective and has demonstrated good reliability and validity coefficients (29-31). The Oswestry questionnaire has high test-retest reliability and good sensitivity to differences (32,33). This questionnaire assesses the extent to which a person's functional ability is restricted by pain. The questionnaire contains items, which concern a variety of daily activities, and how they relate to the patient's pain. The questionnaire was completed prior to start of protocol and again at the end of treatment. For the VAS pain scale, a series of five questions similar to the Oswestry questions were asked about the severity of pain before and after each treatment. The patient was asked to place a mark on a point of the scale representing the severity of

Table 1
Oswestry Questionnaire Results

Initial Scoring (pre-treatment)	Post-treatment scoring
Section 1-Pain Intensity	Section 1-Pain Intensity
score-1	score-0
Section 2-Personal care	Section 2 –Personal care
score-2	score-1
Section 3-Lifting	Section 3-Lifting
score-4	score-4
Section 4-Walking	Section 4-Walking
score-3	score-2
Section 5-Sitting	Section 5-Sitting
score-3	score-1
Section 6-Standing	Section 6-Standing
score-3	score-1
Section 7-Sleeping	Section 7-Sleeping
score-0	score-0
Section 8-Sex Life	Section 8-Sex Life
score-1	score-1
Section 9-Social Life	Section 9-Social Life
score-2	score-1
Section 10-Traveling	Section 10-Traveling
score-2	score-1

Results: 21/50 x 100 = 42% disability
12/50 x 100 =24% disability

his pain. The scale ranged from no pain (score 0) to pain as bad as it could be (score 10). These questions were then plotted as graphs in the results. Pre and post-treatment range of motion tests were also performed with the use of a goniometer (hand held and gravity angle), and these results were also graphed.

Conclusions

The outcome measures in this case study consisted of changes in pain and functional ability as measured by the VAS and Oswestry forms respectively. Improvements in ranges of motion were also measured. The functional ability outcomes (Oswestry) measured the pain associated with daily activities. The Oswestry score went from 42% pre, to 24% post-treatment (see table 1). The five VAS results are presented as x-y graphs (See illustrations 3-8). As a percentage based improvement, the VAS results were 50% improvement in all questions asked.

Range of motion also increased. Our results show a 20-40% improvement in all six directions (see illustration 1). However, these improvements may have been a variance in the measurement using the goinomenter. It is also possible that the improvements on the VAS and Oswestry questionnaire are reflecting the episodic nature of low-back pain. However, based upon chronicity,

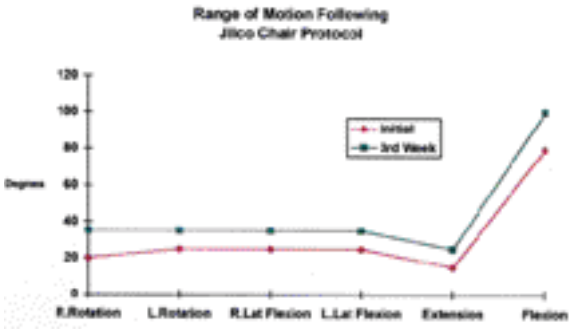


Figure 3. Range of motion following Jilco Chair Protocol

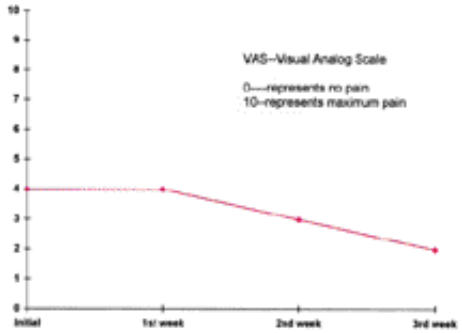


Figure 4. Walking - (Pain During Activity) following Jilco Chair Protocol

Figure 5. Standing - (Pain During Activity) following Jilco Chair Protocol

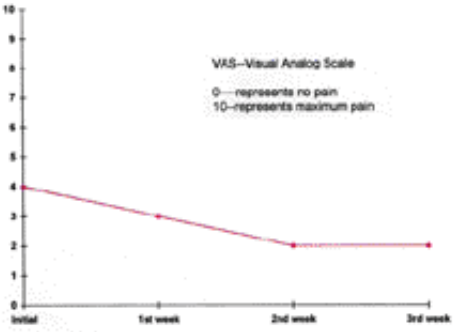


Figure 6. Sitting - (Pain During Activity) following Jilco Chair Protocol

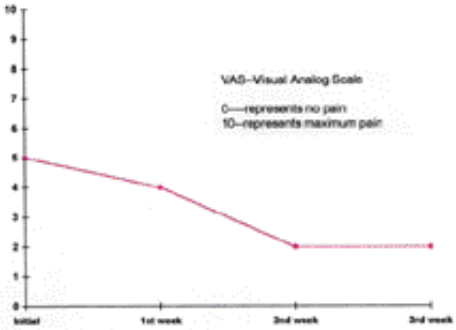


Figure 7. Lifting - (Pain During Activity) following Jilco Chair Protocol

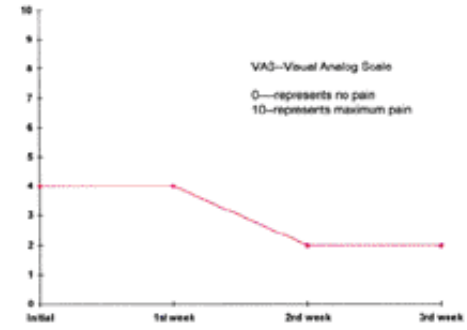
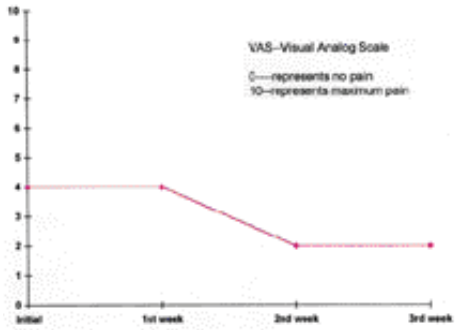


Figure 8. Social Life - (pain During Activity) following Jilco Protocol



the decreased pain brought about by the treatment, and unsuccessful previous home exercises and osteopathic treatment, this conclusion is unlikely. Based on this case study, we believe that a potential benefit exists for decreasing low-back pain by utilizing an exercise protocol that employs the specific combination traction-flexion mobility demonstrated by the Jilco Chair. Further studies should be conducted using a larger patient population.

REFERENCES

1. Papagerogiou AC, Croft PR, Ferry S, et al. Estimating the prevalence of low back pain in the general population: evidence from the South Manchester back pain survey. Spine. 1995;17:1889-1894.

2. Deyo RA, Tsui-Wu JY. Descriptive epidemiology of low back pain and its related medical care in the United States. Spine. 1987;12:264-268.

3. Schwarzer AC, Aprill CN, Derby R, et al. The prevalence and clinical features of internal disc disruption in patients with chronic low back pain. Spine. 1995;17:1878-1883.

4. Yokum Terry R, Rowe Lindsay J. Essentials of Skeletal Radiology. 2nd ed. Baltimore: Williams and Wilkins; 1996. p. 813.

5. Judovich B. Lumbar Traction Therapy. JAMA. 1955;59:549.

6. Colachis S, and Strohm B. Effects of intermittent traction on separation of lumbar vertebrae. Arch Phys Med Rehabil. 1969;50:251.

7. Mathews J. Dynamic Discography: A Study of Lumbar Traction. Ann Phys Med. 1968;9:275.

8. Mathews J. The effects of spinal traction. Physiotherapy. 1972;58:64.

9. Saunders H. Lumbar traction. JOSPT. 1979;1:36-45.

10. Cyriax J. The Slipped Disc. 2nd ed. London:Gower Press; 1971. Chapter 4.

11. Harrison DD, Jackson BL, Troyanovich SJ, Robertson GA, et al. The Efficacy of Cervical Extension-Compression Traction Combined with Diversified Maipulation and Drop Table Adjustments in the Rehabilitation of Cervical Lordosis. J Manipulative Physiol Ther. 1994;17(7):454-464.

12. Cox, Feller, and Cox-Cid: Distraction Chiropractic Adjusting. Topics in Clinical Chiropractic, 1996 Vol 3, Issue 3

13. Williams PC: Lesions of the Lumbosacral Spine: 2. Chronic Traumatic (postural) Destruction of the Lumbosacral Intervertebral Disc. J Bone Joint Surgery 1937; 29:690-703

14. Elnagger, IM., Nordin, M.,Sheikhazadeh, A: Effects of Spinal Flexion and Extension Exercises on Low Back Pain. Spine, Aug, 1991.

15. Infusa A, An Hs, Lim TH, Hasegawa T, Haughton VM, Nowicki BH : Anatomic changes of the spinal canal and intervertebral foramen associated with flexion-extension movement. Spine 1996 Nov 1;21(21):2412-20

16. Salter RB, Bell RS, Kiegy Fw: The Protective Effect of Continuous Passive Motion on Living Articular Cartilage in Acute Septic Arthritis. Clinical Orthopedics and Related Research; Number 159, Sept. 1981

17. Salter Robert B; et al. Clinical Application of Basic Research on Continuous Passive Motion for Disorders and Injuries of Synovial Joints: A Preliminary Report of a Feasibility Study. Journal of Orthopaedic Research. 1984: 1;3; 325-342

18. Salter Robert B, et al. The Biological Effect of Continuous Passive Motion on the Healing of Full-Thickness Defects in Articular Cartilage. Journal of Bone & Joint Surgery December 1980, 62-A8

19. Neugebauer J. Re-establishing of the Intervertebral Disc by Decompression. Med Welt 1976:27:19

20. Cox James M, Aspergren Donald D; A Hypothesis Introducing a New Calculation for Discal Reduction: Emphasis on Stenotic Factors and Manipulative Treatment. JMPT, December 1987 Vol 10, Number 6.

21. Gupta RC, Ramarao SV Epidurography in reduction of lumbar disc prolapse by traction. Arch Phys Med Rehabil 1978; 59, 332-327

22. Deyo RA. Measuring the functional status of patients with low back pain. Arch Phys Med Rehabil. 1988;69:1044-1053.

23. Anderson R, Meeker WC. A meta-analysis of clinical trials of spinal manipulation. J Manipulative Physiol Ther. !992;15:4-9

24. Koran LM. Reliability of clinical methods, data, and judgements. N Engl J Med. 1975; 293:642.

25. Waddell G, Main CJ, Morris EW, et al. Normality and reliability in clinical assessment of backache. Br Med J. 1982; 284:1519.

26. Nelson MA, Allen P, Clamp SE, et al. Reliability and reproducibility of clinical findings in low back pain. Spine. 1979; 4:97.

27. Liebenson Craig: Rehabiltation of the Spine, A Praticioners Manual. Baltimore; Williams and Wilkins; 1996; p. 58.

28. Hansen DT, Ayres JR. Chiropractic outcome measures. J Chiro Tech. 1991; 3:53.

29. Ferraz MB, Quaresma MR, Aquino LRL, et al. Reliability of pain scales in the assessment of literate and illiterate patients with rheumatoid arthritis. J Rheumatol. 1990; 17:1022-1024.

30. McCormack HM, Horne D, Sheather S. Clinical applications of visual analogue scales: a critical review. Psychol Med. 1988: 18:1007-1019.

31. Verhoef, et al. Chiropractic Outcome Study. JMPT:20:4 P.236, 1997.

32. Fairbank JCT, Couper J, Davies JB, O'Brien JP. The Oswestry Low Back Pain Disability Questionnaire. Physiotherapy, 1980; 66:271-273.

33. Hudson-Cook N. Tomes-Nicholson K, Breen A. A Revised Oswestry disability questionnaire. In: Roland MO, Jenner JR, eds. Back pain: new approaches to rehabilitation and education. New York: Manchester University Press, 1989: 187-204