

## CASE STUDY

# Resolution of Chronic Back, Leg and Ankle Pain Following Chiropractic Intervention and the Use of Orthotics

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## ABSTRACT

**Objective:** To describe the outcome of chiropractic care and the use of orthotics in a patient with subluxation, chronic back and left lower extremity pain.

**Clinical Features:** A 26 year old male with chronic back pain and constant left lower extremity pain of nine years. Patient reports standing at work for more than two hours and sitting in one position for extended periods of time is difficult due to leg pain. Leg pain was bilateral for the first three years, until the patient broke his right ankle. Right ankle injury formed a medial arch of the right foot and the right leg pain subsided.

**Interventions and Outcomes:** Contact-specific, high velocity, low amplitude adjustments (ie, Full Spine Technique with Pelvic Drop) were applied to areas of vertebral subluxation. Patient was casted for Foot Leveler<sup>©</sup> orthotics to compensate for loss of left medial longitudinal arch and left foot pronation. The patient

reported a significant decrease in back pain after chiropractic adjustments, which was objectively measured using a Revised Oswestry Disability Index (RODI) and the Quadruple Visual Analogue Scale (QVAS). Patient reports total resolution of lower extremity pain only two days after wearing custom orthotics.

**Conclusion:** The resolution of symptoms in a patient with chronic back, leg and ankle pain after chiropractic intervention is presented. Chiropractic intervention to reduce subluxation and the use of orthotics resolved back and leg pain, which allows the patient to perform activities of daily living with minimal to no pain.

**Key Words:** *Orthotics, foot pronation, foot and ankle, back pain, vertebral subluxation*

## Introduction

The most common complaints seen in a chiropractic office are related to neck or back pain. Seventy to eighty percent of adults will suffer from back pain at some point in their lives<sup>1</sup> and there are many causes of these types of pain. In a study published by the British Medical Journal, they state that a substantial amount of patients who present to primary care with low back pain will have persistent symptoms twelve months after the first consultation.<sup>2</sup> Causes of back pain in the literature include degenerative diseases of the spine and hips, nerve injury, referred visceral pain, musculoskeletal disorders, lower extremity joint disease and soft tissue pathology.<sup>3</sup> This case will focus on the effects the lower extremity has on the rest of the body, and how an imbalance of the lower extremity may be a cause of a larger complaint, such as back pain.

The lower extremity and the spine represent a closed kinetic chain in the upright posture, which gives great potential for the foot and ankle to influence function on this kinetic chain.<sup>4</sup> Disorders such as pes planus or flat feet, are one of many conditions which will decrease function in the lower extremity and may cause symptoms in other regions of the body. The human foot is designed to provide leverage while bearing weight, absorb shock, help maintain balance, and provide protection.<sup>5,6</sup> Flat feet for instance will alter the biomechanics of the foot due to the loss of arch support, and cause the foot to develop abnormal motion, in turn possibly affecting the biomechanics of the rest of the body. It is suggested in the literature that people with flat feet are found to be hyper mobile and the foot susceptible to a larger degree of pronation.<sup>7</sup> There is minimal research describing the effects a loss of arch support may have on subjects with not only lower

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extremity pain but pelvic dysfunction, and how chiropractic care and the use of orthotics may benefit these patients.

## Case Report

### Patient History

Patient is a 26 year old male, with a complaint of chronic back, leg and ankle pain. He reported the following history in a patient interview. Patient reported his chief complaint and reason for seeking chiropractic care as back pain that he first noticed three years ago while lifting bricks at work. He did not see this injury to be serious and thought it was a minor muscle strain. Three years later, standing for more than two hours and sitting in the same position aggravate the pain. He described the pain as being an achy type pain which will turn into a burning type pain, felt mostly around the third through the fifth lumbar vertebrae and into his pelvis.

Patient also had a complaint of left leg and ankle pain, which he said started nine years ago. He reported that when the leg pain started nine years ago, it was bilateral and ran down the lateral sides of his legs into the ankle joint. The right leg pain subsided when he broke his ankle six years ago. He stated that as the ankle healed, he formed an arch in his right foot. He explained that he has had flat feet since childhood, and that the left foot remains with no arch. The leg pain was described as a burning type pain down the lateral aspect of the left leg, and a throbbing pain over the lateral aspect of the foot. He stated that the leg pain aggravates him mostly when having to stand for more than a couple of hours, with slight numbness in the legs while lying on his side, disturbing his sleep quality. It was observed that the patient walks with a slight limp, favoring his left leg.

### Chiropractic Examination

Physical examination of the patient revealed the following notable findings. Subluxations were identified as follows: on palpation there was point tenderness at the upper lumbar spinous processes and the mid to lower thoracics, as well as tenderness at the right posterior superior iliac spine. The spinous processes of L1 and L2 were restricted on right rotation (-θY), the spinous process of T7 was restricted in right rotation (-θY), and the right sacroiliac joint was restricted in the posterior and inferior direction (-Z,-θX). Misalignment at the second cervical vertebra was also noted using static palpation.

An extensive neurological evaluation was done during the physical examination, to determine if leg or back pain was related to a neurological deficit. This exam revealed no deficits neurologically to be the cause of leg pain, and all deep tendon reflexes, muscle tests and dermatome levels were unremarkable. It was reported in the exam the patient had a loss of the medial longitudinal arch of his left foot, and he had a slight arch on the right. Forced dorsiflexion test revealed subtalar involvement on the left foot, which was also found to be over-pronated.

Assessment tools used to measure pain and effects on daily activity were the Revised Oswestry Disability Index (RODI), which measures a disability index for ten different categories.

These are pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, traveling, and change of degree in pain. The other assessment used was the Quadruple Visual Analogue Scale (QVAS), which measures pain intensity at the present, on average, and at its best and worst—in that order on a scale of zero to ten, where ten is the worst possible pain and zero is no pain. These assessments were completed within the first week of care and reassessed throughout the management plan. The first assessment results showed a disability index of 36% on the RODI, which was interpreted as moderate disability. The QVAS recorded a score of 7,4,2,8.

### Chiropractic Care

Contact Specific, high velocity, low force adjustments (i.e., Full Spine Technique with Pelvic Drop) were applied to the areas of vertebral subluxation. The adjustment was a PI (-Z,-θX) of the right sacroiliac joint, contacting the inferior medial portion of the right posterior superior iliac spine using a drop piece with the patient lying in the prone position, pushing the right innominate in a posterior to anterior, inferior to superior, and a slightly medial to lateral line of correction. Patient was also adjusted for a PR (-Z, +θY) at C2. This was done with the patient lying in the supine position and a contact of the right lateral aspect of the spinous process of C2 was made. The line of correction for this adjustment was in the posterior to anterior, lateral to medial, and inferior to superior direction with the patient's head slightly laterally flexed to the right. He was also adjusted in the mid to lower thoracic spine when subluxations were noted. On four different visits, an anterior talus (-X) of the left foot was adjusted, when found with palpation and a forced dorsiflexion test, where the involved talus showed resistance in dorsiflexion. This adjustment was made with the patient lying supine and a contact of talus made on the anterior side of the foot. The foot was distracted and slightly plantar flexed until tension was achieved. The line of correction of this adjustment was made in the anterior to posterior direction.

Chiropractic care began on the twenty-third of June and adjustments were repeated three times a week. On the third visit, the patient was fitted for custom made Foot Levelers® orthotics, to compensate for the loss of the medial longitudinal arch of his left foot. The procedure used to fit the patient for custom orthotics included patient postural analysis and biomechanical assessment with a weight-bearing casting method according to the Foot Levelers® protocol.

On the ninth visit the patient reported no back pain but still had left leg pain, which bothered him while standing all day at work. On August fourth, the seventeenth visit, the patient's custom orthotics arrived. His lower back did not require an adjustment and he stated having no back pain on this visit, but had cervical and mid thoracic segments adjusted. On the seventh of August, only two days after wearing the orthotics, he had no report of back, leg, or ankle pain. On the next scheduled visit two days later, no adjustment was needed after a spinal check.

The patient has been reassessed using the assessment tools mentioned above twice since the start of chiropractic care. His last two assessments were on the twenty-first of July, when the

RODI index score was 20% and the QVAS 2,4,1,7. Patient's most recent assessment on the twenty-third of August showed a RODI disability index score of 14%, a minimal disability, and a QVAS score of 2,2,1,3. This showed the large amount of pain intensity initially recorded on the first visit significantly reduced.

He attributed the minimal disability index score to general stiffness for standing at work all day. On the last assessment the feet were also analyzed, and noted that a medial arch is starting to form on the left foot with the foot no longer overpronated.

Patient still has his spine checked weekly for any vertebral subluxations. He has reported no leg or ankle pain since wearing the orthotics. He still receives adjustments to areas of dysfunction when needed.

## Discussion

The medial longitudinal arch of a normal weight bearing foot is supported by both passive and active structures, which are the connective tissue, bones, ligaments, and muscles.<sup>7</sup> When the foot is displaced by the loss of the arch, these structures cannot properly stabilize the foot, with resultant abnormal motion such as over-pronation. In a published biomechanical experimental study, it is stated that when there is abnormal motion or instability to the ankle joint, support of the medial longitudinal arch should be applied.<sup>8</sup> In a study of 465 podiatric patients reporting various disorders, 62% reported total resolution of chief complaints with the use of orthotic treatment, where 33% reported partial resolution of their chief complaints after fourteen weeks.<sup>9</sup> More research can be focused in the area of kinetic chain complaint resolution with orthotic therapy.

Arch height is an important determinant in the function of the foot and lower extremity.<sup>10</sup> Many studies have been done to determine what may cause these changes in arch height, including growth and development as well as obesity considerations. Studies have found that increased weight loads affected all anatomical structures in the foot—except the medial longitudinal arch. Thus, obesity may not induce structural changes of the arch.<sup>10,11</sup> A growth and development study suggested that subjects who wore shoes before the age of six for more than eight hours at a time had a higher prevalence of flat feet than those who wore shoes for less duration.<sup>12</sup>

It is suggested that the use of orthotics are successfully used to treat low back pain as well, but this statement is poorly validated in the literature to date. A single case study was found that cited a reference exploring the relationship of the subtalar and sacroiliac joint, which suggested that unilateral foot pronation may produce dysfunction in the sacroiliac joint and contribute to low back pain.<sup>13</sup>

Orthotic devices can help biomechanical alignment and reduce stress on joints.<sup>8,14,15</sup> Another study showed that custom made orthotics improved proprioception and reduced fatigue when worn by experienced golfers.<sup>4,5</sup> A study done by Foot Levelers<sup>©</sup> Inc, was cited in an article where twenty-two subjects with flexible pes planus were recruited and

radiographs taken of the feet in two views, where the feet become more supinated—an appropriate outcome for subjects with this condition.<sup>5</sup> Another published article states that Foot Levelers<sup>©</sup> orthotics have been tested and found to provide various benefits, including improved maintenance of skeletal alignment within the foot and ankle as well as enhancement in balance performance and energy levels.<sup>9</sup>

## Conclusion

Chiropractic intervention directed at reducing vertebral subluxation along with the use of orthotics to correct loss of medial longitudinal arch deficits have been demonstrated in this case study to resolve back, leg, and ankle pain. No other case studies were found in the literature that link chiropractic care and the use of custom orthotics to resolution of these types of disorders. Though this represents a single case, the outcome is promising and shows one way specific foot disorders can be treated. More research in this area would be beneficial to patients and the health care profession.

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