

**RESOLUTION OF LOWER LIMB NEUROPATHY AND IMPROVED PHYSICAL FUNCTIONING IN AN 18-YEAR-OLD MALE CRICKETER RECEIVING CHIROPRACTIC CARE: A CASE REPORT**

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## RESOLUTION OF LOWER LIMB NEUROPATHY AND IMPROVED PHYSICAL FUNCTIONING IN AN 18-YEAR-OLD MALE CRICKETER RECEIVING CHIROPRACTIC CARE

### ABSTRACT

**Objective:** To chronicle the resolution of lower limb neuropathy and improvements in physical functioning in a 18-year-old male cricketer receiving Torque Release Technique (TRT) and Activator Methods Chiropractic Technique (AMCT) for the assessment and correction of vertebral subluxation.

**Clinical Features:** An 18-year-old male sought care for a 2-year history of low back, leg and foot pain, and associated neuropathy. Previous management included 13 months of physical therapy, with progressively worsening symptoms. Postural alterations, reduction in cervical and lumbar ranges of motion (ROM), altered thermographic and surface electromyographic (sEMG) studies, and decreased left great toe dorsiflexion strength were found in conjunction with vertebral subluxation throughout the spine

**Intervention and Outcomes:** Chiropractic care using TRT and AMCT protocols was provided for the correction of vertebral subluxation. Subjective improvement in peripheral neuropathy symptoms and self-reported improvements in physical functioning and quality of life was found. Objective improvements included postural, cervical and lumbar ROM, myotomal testing, indicators of vertebral subluxation, thermography and sEMG.

**Conclusion:** A course of chiropractic care, using TRT and AMCT for the correction of vertebral subluxation, was associated with the resolution of chronic lower limb neuropathy and improvements in physical functioning and quality of life. More research is needed to investigate the role chiropractors may play in helping similar patients, and informing clinical practice and future higher-level research designs. (*Chiropr J Australia 2018;46:123-133*)

**Key Indexing Terms:** Peripheral Neuropathy; Chiropractic; Range of Motion; Vertebral Subluxation; Physical Functioning; Quality of Life

### INTRODUCTION

Peripheral neuropathies vary widely in its clinical presentation, most commonly presenting with altered sensation, pain or motor weakness. (1) Peripheral neuropathy can have several causes, including nerve compression/entrapment, trauma, and metabolic and chemically-induced (iatrogenic) conditions, most being associated with pain. (2,3) Acute neuropathy is rare; however, chronic neuropathy (developing over time) is more common and identified through history and examination in clinical practice. (1,4) Diabetic neuropathy is the most commonly reported neuropathy in clinical practice. (5)

Little has reported on chronic peripheral neuropathy in the pediatric population other than diabetic and iatrogenic induced neuropathy. (6,7) Prevalence of peripheral neuropathy in the general population is estimated to be 2.4%; this increases with increasing age. (8,9) Chronic neurologic symptoms are reported as a common

reason for healthcare visits in the adult population.<sup>2</sup>

The typical first-line approach to medical management of neuropathy is pharmacological. (10,11) Physical therapy is often also introduced to help patients whose condition is inhibiting their physical and social functioning. (10) With persistent symptomatology nerve block and local anesthetic is recommended, but this has limited efficacy. (10,11)

There is limited chiropractic literature relating to peripheral neuropathy of the lower limb not relating to diabetes. A recent case report suggests that chiropractic care was associated with resolution of polyneuropathy in an older adult patient. (12) It is commonly recognized by chiropractors and chiropractic students that the central focus of chiropractic care is to assess for and reduce nerve interference, caused by vertebral subluxation, to enhance nervous system function and support the optimization of health and wellbeing. (13-20) The Australian Spinal Research Foundation conceptually define vertebral subluxation as “*a diminished state of being, comprising of a state of reduced coherence, altered biomechanical function, altered neurological function and altered adaptability.*” (21) A vertebral subluxation has been recognized as a complex of functional and/or structural changes in the articulations of the spine and pelvis that compromise neural integrity and may influence organ system function and general health. (22) A vertebral subluxation represents an altered state of afferent input which can lead to maladaptive changes in central neural plasticity resulting in dysfunction. (20,23) Vertebral subluxation correction is achieved through chiropractic adjustments that are typically manually performed. (14,24,25)

The purpose of this paper is to chronicle the resolution of peripheral neuropathy in an 18-year-old male cricketer receiving Torque Release Technique (TRT) and Activator Methods Chiropractic Technique (AMCT) chiropractic care for the correction of vertebral subluxation.

## CASE REPORT

### *History*

An 18-year-old male presented with a 2-year history of low back, leg and foot pain and associated neuropathy. The symptoms had initiated as a result of a cricket injury as a fast bowler. The pain was constant and could be as severe as 8/10. He reported a stabbing sensation in his left piriformis, pain in his left calf, “pins and needles” at the front and medial side of the foot when sitting and loss of strength in the left forefoot. The presenting symptoms affected his ability to perform tasks of daily living, exercise and sleep.

Previous management included 8-months of initial physical therapy during which time the patient reported the “symptoms progressed and the [left] piriformis became tighter”. Further consultation with a Sports and Exercise Physician resulted in plain film and magnetic resonance imaging suspecting a left L5/S1 nerve root irritation. Imaging reports state a conclusion of normal examination, no occult fracture or acute disc injury to account for left-sided symptoms. Correspondence from the Physician to the Physiotherapist suggested “the solution is to find better ways of supporting the

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spine given that the most sensitive test available to us at this time has not shown unidentified pathology". Physiotherapy continued for a further 5-months before the patient presented for chiropractic care.

The patient was assessed using the Health Wellness and Quality of Life (HWQL) instrument, which measures 5 self-reported domains as a percentage. The 5 domains are physical functioning, mental and emotional state, stress evaluation, life enjoyment and overall quality of life (QoL). (26,27) The self-reported assessment scores were physical functioning (63%), mental and emotional state (35%), stress evaluation (55%), life enjoyment (52%), and overall QoL (54%). (Figure 1)

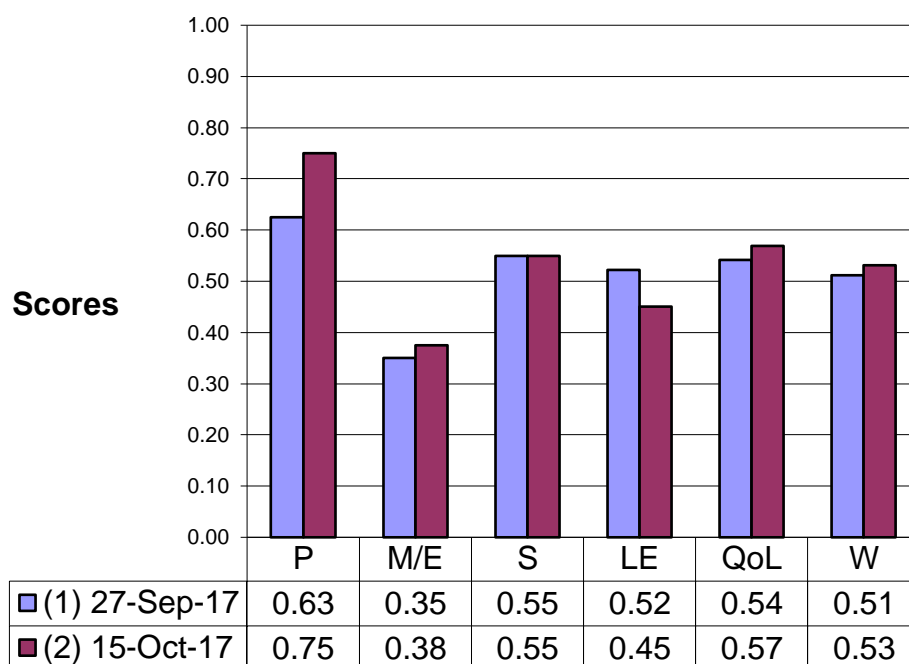


Figure 1. Comparison of HWQL survey at initial and progress exams

### Examination

Posture examination, performed by observation, revealed a markedly higher left hip and shoulder, with forward head carriage of approximately 4cm. Cervical and lumbar spine ranges of motion (ROM), using bubble inclinometry. (28,29) Cervical ROM revealed flexion of 40°, extension of 60°, left lateral flexion of 30° and right lateral flexion of 20°. Lumbar ROM revealed flexion of 60°, extension of 30°, left and right lateral flexion both being 20°. Pain was reproduced on active lumbar flexion and extension.

Orthopaedic testing was negative for Valsalva, Straight Leg Raiser and Braggards tests. Neurological testing was performed revealing inability of the patient to perform left great toe dorsiflexion against resistance (graded 1/5), all other neurological testing was normal. Sensory and deep tendon reflex assessment of the lower limb were normal.

Initial chiropractic examination for vertebral subluxation was performed using commonly used clinical indicators. (17,29,30) The examination revealed a right leg

length inequality (right leg appearing shorter than the left in the prone position), positive right Derifield and left sacral restriction. Static palpation revealed hypertonicity of the levator scapulae bilaterally, scalenus medius bilaterally, left quadratus lumborum, piriformis and gluteus medius, and paraspinal muscles at C7-T3 on the left and T2-T6 on the right. Spinal palpation revealed reduced joint play (end-feel) at C1-4, T1-6, L2-5, and the left sacroiliac joint, and discernable inter-segmental motion restriction of C1 on the right and C2 on the left, L3 in extension, L5 on the right, and the left ilium.

Thermography and surface electromyography (sEMG) studies were performed using the Insight Millennium™. Paraspinal thermography is used as an indirect measure of dysautonomia to assess the potential impact of vertebral subluxation on the autonomic nervous system. (31-33) Thermography revealed varying degrees of autonomic hyperactivity at C3, T1-T9, L3 and L4. Surface EMG is used to measure paraspinal muscle dysfunction, a manifestation of vertebral subluxation, and a neuromuscular response to chiropractic care. (34-36) Surface EMG revealed areas of hyperactivity at C1, C3, C5, C7, T1, T2, T4, T6, T10, T12, L1, L3 and S1. (Figure 2)



Figure 2. sEMG and Thermography study at initial visit

### Intervention and Outcomes

Chiropractic care was initially administered twice weekly over a period of 6-weeks using a combination of TRT and AMCT protocols. The practitioner choice in combining the two models of chiropractic care were to address the “tonal” and “segmental” components of vertebral subluxation. TRT is considered a tonal model while AMCT a segmental model of chiropractic care.

The TRT model of chiropractic care focuses on assessing for areas of vertebral subluxation primarily at locations of dural attachment, being the occiput, upper and lower cervical spine (C1, C2, C5), sacrum, coccyx and the pelvis, through functional leg checking and confirmatory spinal pressure testing procedures. The application of the chiropractic adjustment is via the hand-held Integrator™ instrument. (37,38)

The AMCT protocol uses a functional leg-length analysis combined with provocative maneuvers (isolation, pressure and stress tests) to determine involved spinal levels.

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A hand-held instrument (Activator II™) is used to deliver a specific, high-velocity, low-amplitude thrust for the chiropractic adjustment. (39)

At the 2<sup>nd</sup> visit the patient commented they were “feeling better and with less pain”. At the 4<sup>th</sup> visit the patient reported he was “the most pain free” he had been in “ages”. At this time, he was also tested for left great toe dorsiflexion against resistance, and was able to perform this with some fatigue (graded 4/5). At the 8<sup>th</sup> visit he reported his pelvis “felt stuck” and this was reported to have resolved by the 10<sup>th</sup> visit.

Self-reported improvements were recorded in the physical functioning, mental and emotional state, and overall QoL domains of the self-reported HWQL assessment. The greatest improvement was reported in his perceived physical functioning (increasing from 63% to 75%). For a complete comparison of HWQL results see figure 1.

Posture examination revealed a level pelvis with the left shoulder remaining higher and reduced forward head carriage to approximately 1-2cm. Cervical spine ROM revealed flexion of 60° (20° increase), extension of 60°, left lateral flexion of 45° (15° increase) and right lateral flexion of 50° (20° increase). Lumbar spine ROM revealed flexion of 70° (10° increase and now without pain), extension of 50° (20° increase and now without pain), left lateral flexion of 30° (10° increase) and right lateral flexion of 30° (10° increase).

Neurological testing revealed resolution of the patient to perform left great toe dorsiflexion against resistance (now graded 5/5). All other neurological testing remained normal.

Chiropractic examination revealed balanced leg length in the prone position with no Derifield or cervical syndrome apparent. Sacral restriction was still present on the left. Static palpation revealed only left paraspinal muscles at L5 on the left. Restricted joint play was only obvious at the left sacro-iliac joint and L5. No obvious restriction in inter-segmental motion was indicated on spinal palpation. This suggests the indicators of vertebral subluxation reduced over the course of chiropractic care. A summary of the spinal levels adjusted over the course of care, as indicated by the TRT and ACMT protocols, can be seen in table 1.

Table 1. Adjustment summary by visit

Visit	TRT Protocol	AMCT Protocol
1	C0 L L/T, C2 R R/T	L AS, R PI, L5 R, L4 R, T12 R
2	C1 posterior R, C2 L L/T	L AS, R PI, L5 R, T12 R
3	C0 R L/T, C2 R R/T	L As-EX, R PI, L5 R, T12 R
4	C1 posterior R	L AS, L4 L, T12 R T6 L, C7 L
5	C0 L R/T, C2 L L/T, Cox	L As, L4 L, T8 R
6	C1 Lat R R/T, C2 R R/T	R PI, T12 R, C7 L
7	C1 posterior R, C2 L L/T, C0 R L/T	L AS, R PI, L5 sup, L4 inf, T12 R
8	C1 Post R, C2 L L/T	L As, L5/S1 facet L, T12 R, T6 L

9	Post Occ, S3 L, Cox	L4 R, QL L, T8 R
10	C1 posterior R, Co L R/T, C2 L L/T	L5/S1 facet L, QL L, T6 L
11	No adjustment	L As, L5 R, T12 R, QL L, Psoas R
12	Post Occ, C2 L L/T	PL Sac, R PI, QL L, T12 R, T6 R

Significant changes were recorded in thermography and sEMG after the progress examination. Thermography findings reduced to only 3 levels of hyperactivity from the 12 levels at the initial examination, and a reduction in severity of the initial findings. Surface electromyography findings reduced to indicators of hyperactivity at C1, C3, C5, T10, T12, L3, L5 and S1, and a reduction in severity from the initial findings. These results represent an overall reduction in dysautonomia and increased coherence and reduction of hyperactivity in paraspinal neuromuscular function. (31-36) (Figure 3)

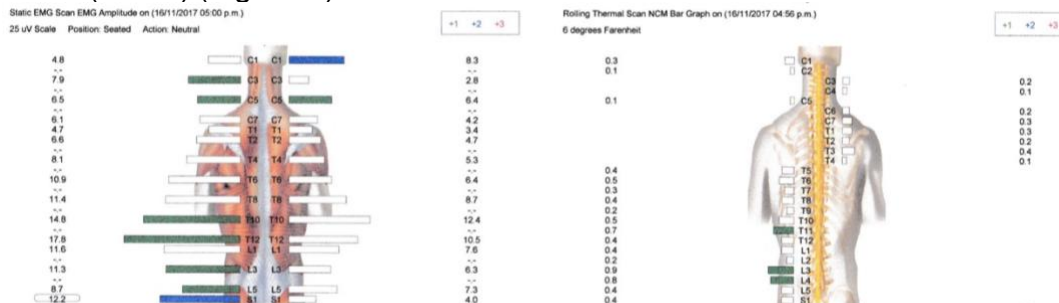


Figure 3. sEMG and Thermography study at progress examination

## DISCUSSION

This case chronicles a course of chiropractic care associated with the resolution of lower limb neuropathy in an 18-year-old cricketer. Additionally, improvement in self-reported physical functioning, mental and emotional state and life enjoyment, and objective improvement in posture, cervical and lumbar ROM, and reduction in vertebral subluxation was found.

Complementary and alternative medicine (CAM), including chiropractic, has been used by members of the general population with musculoskeletal complaints such as neuropathy. (40) A commonly reported reason for people choosing CAM services for neuromusculoskeletal conditions such as neuropathy is perceived inadequate pain relief from conventional treatments. (35) Peripheral neuropathy is a condition reported as commonly seen by chiropractors. (36) The limited evidence in the chiropractic literature does suggest that chiropractic is effective for lower limb peripheral neuropathy. (12,42-46)

Pertinent to the current case, 2 cases reported in the literature describe improvements in peripheral neuropathies in athletes during the course of conservative management by chiropractors. (47,48) Aspergen et al. describe reduction in symptoms and improved functioning in a 21-year-old female volleyball

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player presenting with costochondritis of 8-months duration. Improvements were monitored over a course of conservative management which included manipulation, soft tissue mobilization. (47)

Robb and Sajko described the reduction in symptoms and improved functioning in a 21-year-old male baseball pitcher presenting with posterior interosseous neuropathy of 1-week duration. Resolution of symptoms was achieved over a 5-week course of conservative management which included myofascial release and soft tissue mobilization. (48)

The overall positive result of the current case is congruent with previously reported studies that investigated the effects of chiropractic care in cases of lower limb peripheral neuropathy and peripheral neuropathy in athletes. (12,42-48) More research is needed to investigate the role chiropractors may play in helping similar patients so as to inform clinical practice and future higher-level research designs.

### *Limitations*

There are inherent limitations of a single case study; that of being an isolated case not controlled for external factors and natural progression, due to the inherent limitations the findings cannot be generalized or causation of vertebral subluxation implied. To further gauge the effectiveness of care, further studies are needed.

Posture assessment was only visually observed by the chiropractor pre and post the course of chiropractic care. No formal objective measure was used to assess posture, which may be open to scrutiny.

Finally, QoL was assessed using an instrument that is not validated. While this is a self-rated report based on the patient's subjective experience it isn't comparable to a standardized population. The HWQL instrument has, however, been used and the results reported on in the chiropractic literature. (12,26,27,49-56)

## **CONCLUSION**

A course of chiropractic care using a combination of TRT and AMCT protocols was associated with resolution of lower limb neuropathy, improved self-reported physical functioning, mental and emotional state and overall QoL, improvement in objective posture assessment, spinal ROM and neurological assessment, and reduction in indicators of vertebral subluxation.

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