CASE REPORT

Chiropractic management of ‘intractable’ chronic whiplash syndrome

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Abstract

Hyperflexion/extension injuries are common and often result in neck and low back pain. As a neuromusculoskeletal complaint, chiropractors, as primary healthcare clinicians, are increasingly providing treatment in such cases. In the case described, a 22-year-old female presented 3 years after a ‘whiplash’ type injury complaining of chronic neck pain and stiffness and frontal headaches. The neck pain had commenced 24 h after a road traffic accident (RTA) and had remained severe for 2 weeks, during which time a soft collar was worn. The neck pain and stiffness had persisted and had worsened in the 6 months leading up to presentation. In addition, frontal headaches had also developed.

This case demonstrates that chronic ‘whiplash’ injury patients can respond well to appropriate conservative management, even in the presence of poor prognostic indicators. The management protocol in this case consisted of chiropractic spinal manipulative therapy, soft tissue work and post-isometric relaxation (PIR) techniques to address biomechanical somatic dysfunction. In addition, active rehabilitation exercises, self-stretches and proprioceptive exercises were utilised to address postural and muscle imbalance. On the seventh treatment, the patient reported no neck pain, no headaches and unrestricted cervical spine range of motion. At 4 months follow-up, the patient continued to be free of headaches and neck stiffness and reported only mild, intermittent neck pain. This case demonstrates the use of chiropractic management of chronic ‘whiplash’ type injuries. However, more high-quality evidence is required to support the use of chiropractic care for chronic and, indeed, acute ‘whiplash’ cases.

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KEYWORDS
Cervical spine injury; Chiropractic; Chronic whiplash syndrome; Headache; Hyperflexion/ hyperextension injury; Manipulation; Pain; Rehabilitation exercise

Introduction

‘Whiplash’ is a common injury1,2 with an estimated incidence of approximately 4 cases per 1000 persons.3 The incidence of ‘whiplash’ type injuries is steadily increasing,4,5 highlighting the need for research in this area. Neck pain and stiffness are the most frequently reported symptoms associated with ‘whiplash’ type injuries6–8 and, as such, patients with ‘whiplash’ trauma are likely to make up a high percentage of those seeking chiropractic care. This highlights the need for chiropractors and other practitioners of manual therapies to be knowledgeable in the area of ‘whiplash’, and reflects both the chiropractic undergraduate degree syllabus and the emphasis of post-graduate continuing professional development.

‘Whiplash’ injuries are commonly, but not exclusively, associated with road traffic accidents (RTAs). A rear-end RTA usually involves a sudden acceleration then deceleration with resultant
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<table>
<thead>
<tr>
<th>Grade</th>
<th>Signs and symptoms</th>
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<tbody>
<tr>
<td>Grade 0</td>
<td>No complaint of pain or discomfort. No physical sign(s) of injury</td>
</tr>
<tr>
<td>Grade 1</td>
<td>Neck complaint of pain, stiffness or tenderness only. No physical sign(s) of injury</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Neck complaint of pain, stiffness or tenderness and physical, musculoskeletal sign(s) of injury such as point tenderness or decreased range of motion</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Neck complaint of pain, stiffness or tenderness and neurological sign(s) or injury</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Neck complaint of pain, stiffness or tenderness and fracture or dislocation</td>
</tr>
</tbody>
</table>

Lumbar joint dysfunction and cognitive difficulties following a Grade 2 accident. Paraesthesia, shoulder girdle pain, temporomandibular joint dysfunction, headaches, dizziness, blurred vision, dysphagia,\footnote{Indicating considerable cervical instability whereby the patient finds relief from holding their head, warrants further investigation. In the presence of normal radiographic findings, MRI imaging is normally only considered in the case of persistent neurological deficit\cite{18,19} or when significant soft tissue injury is suspected (such as anterior longitudinal ligament injury or discal lesion) to evaluate the need for surgery.\cite{20}}

due to nerve root or spinal cord damage. In such cases, the prognosis is potentially much worse and an appropriate and immediate surgical referral is obviously required. Post-'whiplash' patients should, therefore, be evaluated neurologically for cranial nerve abnormalities; sensory, motor and reflex deficits and cerebellar signs and symptoms. Radiographic investigation may also be required depending on the nature and severity of the RTA and the signs and symptoms presenting. For example, a positive 'Rust' sign, indicating considerable cervical instability whereby the patient finds relief from holding their head, warrants further investigation. In the presence of normal radiographic findings, MRI imaging is normally only considered in the case of persistent neurological deficit\cite{18,19} or when significant soft tissue injury is suspected (such as anterior longitudinal ligament injury or discal lesion) to evaluate the need for surgery.\cite{20}

Chronic whiplash syndrome

Neck pain associated with an RTA usually commences within 48 h and, although in most cases this resolves within 6 weeks,\cite{21} it is estimated that between 12 and 50\% of patients become chronic sufferers.\cite{7,22-26} Chronic ‘whiplash’ syndrome (CWS) is the term used to describe patients who retain WAD symptoms, 6 months after the RTA\cite{2} as in the case described here.

The exact risk factors for developing CWS and the mechanisms involved remain controversial\cite{22} and poorly understood.\cite{23} The contributing factors are likely to include unresolved somatic injury, psychological overlay and outstanding medicolegal matters.\cite{11,22} Studies have highlighted a number of factors that are likely to increase the risk of developing chronicity and, therefore, a poorer prognosis. These include, younger age at the time of the RTA, female gender, neck pain on palpation in the acute phase, pain or numbness radiating into the upper limb and associated headache\cite{7}, as well as neck stiffness and muscle spasm and pre-existing cervical degenerative spondylitis.\cite{27} In addition, a positive correlation has been established between severity of injury and delayed recovery.\cite{28-30}
The impact of medicolegal factors on recovery

There is some evidence to suggest that outstanding medicolegal matters or insurance claims, often associated with RTA cases, may have a detrimental effect on recovery and result in the development of CWS. This is supported by one study that reported lower pain levels, improved function and absence of depressive symptoms in patients when medicolegal matters were resolved more rapidly. A study of RTAs in Lithuania concluded that, where there is no preconceived notion of CWS and no medicolegal involvement, acute 'whiplash' injury is self-limiting. These studies suggest that acute 'whiplash' injury is typically self-limiting and that outstanding medicolegal matters, rather than somatic, biomechanical dysfunction, impact more significantly on the rate of recovery. This was not, however, the case in the case described where chronicity had developed in the absence of outstanding medicolegal matters. Whether physiological or psychological factors are at play, it is clearly advantageous to encourage patients who have experienced a 'whiplash' injury to actively pursue outstanding medicolegal or insurance matters.

The impact of psychological overlay on recovery

It is estimated that 25% of RTA victims develop psychological overlay following physical injury and this has been identified as a risk factor for the development of chronicity. Chronic cases have an increased risk of developing other long-term health complaints, such as headaches, fatigue, sleep disturbance, thoracic pain, low back pain and general ill health. Depression and anxiety and lower performance in concentration and attention tests may also be observed, although causality in these cases remains controversial. These findings support the notion that psychological overlay may play an important role on general physical well-being and the development of CWS. Although some believe that CWS is not a direct result of somatic injury, an intervention that reduces somatic pain is likely to favourably affect impaired cognition and the psychological overlay associated with the development of chronic pain.

The likely contribution of psychosocial factors in the development of CWS clearly indicates that any therapeutic intervention must address both the somatic and psychological spectra of the condition. This may partially explain why chiropractic care is felt to be appropriate for the management of chronic 'whiplash' cases, because, as concluded by Vernon, chiropractic care takes a biopsychosocial approach and thus affects both the somatic and psychological components involved.

Case report

Miss F, a 22-year-old female entertainment manager, presented with neck pain and stiffness of 3 years’ duration following an RTA. The pain did not commence immediately after the RTA, but started within 24 h and remained severe for 2 weeks. Miss F had been the front-seat passenger at the time of the accident. A seatbelt had been worn and a headrest was present. The speed at impact was unknown, however, the car was slowing down at impact and not written-off. Miss F’s car hit the car in front and was subsequently hit from behind by three cars, one after the other. Miss F did not loose consciousness, however, she did attend hospital where radiographs were taken of the cervical spine. These were read as normal by the hospital staff. The treatment prior to presentation consisted of the use of a soft collar, worn constantly for 1 week immediately following the RTA, then for a further week on an intermittent basis.

On the day of presentation, Miss F reported an unresolved 'nagging' neck pain with an intensity of 3/10 with occasional sharp, more intense pain on certain, variable neck movements. Miss F stated that the neck pain and stiffness had worsened over the previous 3 months. In addition, right-sided frontal headaches had developed in the 6 months prior to presentation. More recently, these had worsened in terms of frequency and duration. The neck pain was aggravated by unguarded neck movements, for example, a sudden jolt when driving and relieved by rest. Miss F felt that the headaches correlated with the neck pain. No dizziness or radiating symptoms were reported by the patient and the family and personal medical history were unremarkable.

On examination, a mild anterior head carriage was observed together with rounded shoulders and prominent sternocleidomastoid musculature bilaterally, indicating the development of an upper-crossed type posture. Miss F showed signs of guarding and avoided sudden or end range of motion of the cervical spine. Generalised hypersensitivity to digital pressure over the shoulder girdle was noted on palpation. Hypertonic and tender musculature with palpable taut bands was noted bilaterally, involving the upper trapezius, suboccipitals, scalenes, infraspinatus, subclavius, pectoralis and sternocleidomastoid musculature. Pressure over the belly of the sternocleidomastoid muscle resulted
in local pain and reproduced the frontal headache, indicating an active trigger point. In addition, shoulder compression with contralateral lateral flexion of the cervical spine gave upper trapezius muscle pain. On performing Jull’s test, Miss F was unable to actively hold her head for more than 3 s, indicating weak deep neck flexors. Cervical motion was restricted and painful in active and passive end range of motion in all directions bilaterally. Jackson’s vertical facet compression test reproduced pain over the posterior facet joints of the mid-cervical spine bilaterally but no radicular symptoms. Segmental posterior facet joint tenderness and dysfunction was noted throughout the cervical and upper thoracic spine. There were no sensory, motor or reflex deficits noted in the upper or lower limbs and cranial nerve assessment was unremarkable. Vertebral artery insufficiency tests were negative.

The history and examination findings indicated a working diagnosis of Grade 2 WAD, comprising chronic, moderate, post-traumatic cervical facet joint dysfunction with associated cervicogenic headaches, complicated by postural and muscular imbalance. Miss F was identified as having a potentially poorer prognosis due to being female, the presence of neck pain and stiffness, muscle spasm and headaches and the long-term nature of her symptoms. In addition, an aspect of psychological overlay as a contributing factor was possible due to the presence of chronic pain. There were no outstanding medicolegal matters.

The treatment plan provided in this case was specific chiropractic spinal manipulative therapy (high velocity, low amplitude cavitational thrust) to the upper cervical spine and the cervicothoracic region together with manual traction of the cervical spine. Spinal manipulative therapy of the C4 to C6 posterior facet joints was avoided, as this is typically where the apex of forces is applied in ‘whiplash’ type injuries and, therefore, a possible area of hypermobility. Soft tissue work to hypertonic musculature, with particular attention to the sternocleidomastoid, suboccipital and upper trapezius musculature included trigger point therapy and post-isometric relaxation techniques. Active rehabilitative exercises were given to include deep neck flexor training and lower scapular stabilizer strengthening. Cervical spine end range of motion exercises involving rotation and lateral flexion to improve proprioceptive feedback were also encouraged. The patient was instructed on how to stretch the upper and middle section of the trapezius muscles. A combination of active and passive care was the treatment plan of choice in line with recent studies due to the chronic nature of the condition and the association with chronic pain and psychological overlay. The active rehabilitation treatment plan used in this case is detailed in Table 2.

A treatment frequency of twice a week for 2 weeks before reassessment was proposed and, following three treatments, Miss F reported considerable improvements in her symptoms. However, on the fourth treatment visit, Miss F reported that she had been involved in another RTA the previous day, in which she was the rear-seat passenger in a car that hit a stationary vehicle, around which it was manoeuvring, at less than 10 mph. This had resulted in a return of the ‘nagging’ type neck pain and frontal headache pain experienced prior to the initial presentation. Although this accident may have resulted in an acute exacerbation of a chronic ‘whiplash’ injury and further worsened prognosis, the mild nature of the RTA and resultant symptoms and absence of additional clinical findings led to a continuation of the treatment plan previously described. Following two further treatment visits, the neck pain and headache had again subsided. The treatment frequency was reduced to once a week for a further 2 weeks with no recurrence of pain.

At treatment visit number 7, after a 4-week period of active and passive care, Miss F reported no neck pain or headaches and unrestricted cervical ROM. At 4 months follow-up, the patient had remained free of headaches, had unrestricted cervical ROM and reported only occasional mild neck pain.

**Discussion**

Historically, during the acute phase of a ‘whiplash’ type injury, the preferred medical approach has been rest, analgesia and a soft cervical collar to avoid the risk of further injury, reflected in this case. However, recent studies suggest that soft collars do not influence the duration or severity of pain following an RTA and that rest and immobility actually slow the healing process. The current thinking is that mobility and maintaining good posture in the acute phase, together with active rehabilitative exercises in the subacute/chronic phase are more beneficial.

The most commonly used chiropractic intervention in the acute phase of a ‘whiplash’ injury typically focuses on pain relief and anti-inflammatory strategies. Mobility is maintained with cervical spine mobilisation and manual traction, often used
in the case of a radiculopathy, together with soft tissue work and electrotherapy, to reduce muscle spasm. Specific chiropractic manipulation may also be considered in the acute phase. In chronic ‘whiplash’ cases, specific chiropractic spinal manipulation techniques are commonly used by chiropractors often incorporating rehabilitative exercises. With an emphasis on active care, exercise and an early return to normal activities, chiropractic management appears to fit nicely with current evidence regarding ‘whiplash’ injury. Although there is increasing evidence to support conservative care, such as chiropractic, in the treatment of post-‘whiplash’ injuries, the most effective conservative approach remains controversial. A recent systematic review concluded that, due to the small number of randomised controlled clinical trials available, there is inconclusive evidence for the efficacy of conservative treatment for ‘whiplash’ patients. Other studies identify the need for further research into specific treatments, such as cervical traction. This emphasizes the need for more high-quality research to support the efficacy and best practice of conservative care for both acute and chronic ‘whiplash’ injuries.

Table 2  Active rehabilitative programme for the case described.

<table>
<thead>
<tr>
<th>Rehabilitative exercise</th>
<th>Area targeted</th>
<th>Instructions to patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep neck flexor exercise (1)</td>
<td>Strengthening deep neck flexors of the cervical spine</td>
<td>Patient supine. Patient instructed to imagine a pencil with one end on tip of the nose and long enough to reach a point on the ceiling directly above the head. Then, make slow, small imaginary circles. Slowly increase the size of the circle, concentrating on making perfectly round circles. Repeat in reverse direction. Ten times each way, twice per day</td>
</tr>
<tr>
<td>Deep neck flexor exercise (2)</td>
<td>Strengthening deep neck flexors of the cervical spine</td>
<td>Introduced once mastered deep neck flexor exercise (1) in second week. Patient supine. Draw scapula down and slightly retract to activate lower scapula stabilisers. Imagine a skewer through external auditory meatus. Flex head (less than 1 cm) around imagined skewer. Concentrate on relaxing tongue away from roof of mouth. Repeat 10 times, twice per day</td>
</tr>
<tr>
<td>Wall angel</td>
<td>Strengthening lower scapular stabilisers</td>
<td>Standing with back to wall and feet approximately hip width apart and approximately 12 in. from the wall. Tilt pelvis to flatten lumbar spine to the wall. Raise arms above head and against the wall. Pull down arms from elbows towards waist maintaining arms and low back in contact with wall. Contract lower scapular stabilizers throughout arm movement. Hold contraction for a count of 10 s whilst concentrating on retracting lower aspect of scapular. Ten times twice per day</td>
</tr>
<tr>
<td>Latissimus dorsi ‘pull downs’</td>
<td>Strengthening lower scapular stabilisers</td>
<td>Introduced once mastered wall angel in second week. Two sets of 10 seated ‘pull downs’ with minimal weight (5 kg) focusing on the contraction of the lower scapular stabilizer, by retracting the lower aspect of the scapula, before each pull down. Exercise carried out at patient’s gym</td>
</tr>
<tr>
<td>Cervical spine range of motion</td>
<td>Proprioceptive training</td>
<td>Seated position. Rotate head to left and hold at end range of motion for 10 s. Return to neutral and hold for 10 s. Rotate to right and hold for 10 s and back to neutral for 10 s. Repeat 10 times, two times per day</td>
</tr>
<tr>
<td>Mid-trapezius and rhomboid musculature stretch</td>
<td>Stretch trapezius and rhomboid musculature</td>
<td>Seated position. Take right arm forward and across chest and hold against chest with left arm. Rotate body towards left. Hold for 10 s. Repeat using other arm</td>
</tr>
<tr>
<td>Upper trapezius musculature stretch</td>
<td>Stretch upper trapezius musculature</td>
<td>Seated position. Laterally flex neck to right, then slightly flex neck forward. Use weight of right hand to increase stretch. Hold for 10 s. Repeat on the other side</td>
</tr>
<tr>
<td>Levator scapulae musculature stretch</td>
<td>Stretch levator scapulae musculature</td>
<td>Seated position. Laterally flex neck to right whilst left hand holds chair seat, lean to the right. Hold for 10 s. Repeat with lateral flexion to the other side</td>
</tr>
</tbody>
</table>
a patient has poor prognostic indicators sufficient to suggest intractability in response to traditional management, appropriate conservative care can have a rapid and beneficial outcome.

One of the reasons chiropractic manipulation may be likely to have a favourable affect on 'whiplash' patients is its focus on the posterior cervical facet joints, which are a common source of pain following a 'whiplash' injury.44,60 Facet joints may be the source of pain due to altered joint mechanics or as a result of pinching of the facet joint capsule or synovium.12 Correcting the joint mechanics and reducing the pinching effect with an appropriate specific chiropractic manipulation may help to restore the normal function, reducing nociceptive input and secondary muscle spasm. Specificity is required to avoid hypermobile segments that may exist at the apex of the 'whiplash' forces, typically C4 to C6. If specificity cannot be accommodated, then the chiropractor must question the appropriateness of the use of spinal manipulative therapy. If hypermobile segments can be avoided, then specific chiropractic manipulative therapy to hypomobile segments may be considered to be appropriate, even in the acute 'whiplash' phase.

One of the reasons for the controversy regarding chiropractic care for 'whiplash' patients may be due to the timing of the treatment. As a result of a 'whiplash' type injury, there is increased stress applied to the cervical spine soft tissue structures, such as the musculature, ligaments and joint capsule,5,11 in a similar way to the stress applied to the soft tissues in, say, an ankle inversion sprain. A question therefore arises as to the appropriate timing of specific chiropractic manipulation following a 'whiplash' type injury, which may take the affected facet joint and soft tissue structures further into the paraphysiological zone. In the case of an ankle sprain, early adjunctive treatment is not recommended until resolution of the acute inflammatory phase. However, in the sub-acute phase, when adhesions and scar tissue are forming, chiropractic manipulation of the ankle joints may promote flexibility,61 decrease pain and promote soft tissue healing. However, a further clinical dilemma, in the case of an acute 'whiplash' injury, is that there is typically reduced cervical ROM due to muscle spasm18 and guarding. It is therefore possible that the facet joints may be palpated as dysfunctional, tender and hypomobile in the presence of segmental hypermobility. As a result, it is incumbent upon the practitioner to carefully evaluate the patient for the appropriateness of spinal manipulation therapy immediately following a 'whiplash' injury to avoid further insult. Indeed, the question of specificity also arises as spinal manipulation designed to affect the hypomobile segments may also allow adjunctive forces to affect hypermobile segments. As a result, the use of spinal manipulation in the acute phase of a 'whiplash' type injury remains controversial64 indicating the need for more research in the area.

For chronic 'whiplash' patients, specific chiropractic manipulation has been established as an appropriate conservative option,24,53,54 with one study finding 93% of CWS patients improving with chiropractic manipulation,24 supporting chiropractic care in the chronic case. In addition, another study of chronic ‘whiplash’ patients concluded that a combination of spinal manipulation with rehabilitative exercises was more beneficial than manipulation alone.54 As a multimodal treatment plan has the potential to be effective for patients with chronic ‘whiplash’-related symptoms,45,63 this was the approach used in this case. The patient was given active rehabilitative exercises that were incorporated into the treatment regime from the outset. As pain levels subsided, the patient felt able to return to a more active, gym-based exercise programme, incorporating the rehabilitative exercises. The combined active and passive approach in this case is believed to have impacted beneficially on both somatic dysfunction and psychological overlay due to chronicity, even in the presence of poor prognostic indicators.

Conclusion

‘Whiplash’ injuries are common and patients often present to chiropractors due to the presence of neck or low back pain. Chiropractic management of CWS typically involves a combination of specific spinal manipulative therapy (SMT), cervical mobilisation and manual traction, soft tissue work, electrotherapy, cryotherapy and active rehabilitation care. This multimodal approach is in line with current research that promotes an early return to normal activities, believed to promote a more rapid recovery. SMT focuses on correcting neuromusculoskeletal dysfunction and active care addresses postural and muscle imbalance together with psychological overlay, often associated with chronic pain sufferers.

This case confirms the presence of CWS, induced by somatic, biomechanical dysfunction. There were no medicolegal matters outstanding and minimal psychological overlay supporting the development of CWS as one involving somatic injury and dysfunction. The most likely contributing factor to the development of chronicity in this case was the presence of posterior cervical facet
joint dysfunction together with postural and muscular imbalance. The rapid and complete resolution of symptoms following a 3-year history of pain, even in the presence of poor prognostic indicators, provides additional support for the use of chiropractic management of CWS.

The appropriate timing of chiropractic SMT, following a ‘whiplash’ type injury, however, remains controversial, especially in the case of an acute ‘whiplash’ case due to the possibility of hypermobility. In this case, an acute, mild exacerbation of the chronic condition was treated successfully with SMT and soft tissue work with rapid resolution of symptoms supporting the use of SMT in an acute phase of a ‘whiplash’ injury. However, more high-quality evidence to support the use of chiropractic spinal manipulation for chronic and, indeed, acute ‘whiplash’ injuries is required.

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References