Clinical Presentation, Quantitative Sensory Testing, and Therapy of 2 Patients With Fourth Thoracic Syndrome

Gary A. Mellick, DO,[a] and Larry B. Mellick, MS, MD[b]

Abstract

Objective: The aim of the study was to describe 2 representative cases of patients presenting to an osteopathic pain practice with signs and symptoms consistent with the fourth thoracic (T4) syndrome. In addition, this article reports the application of quantitative thermosensory testing and dynamometer strength testing to confirm associated sensory and motor strength changes. Nonmanipulative therapeutic interventions are reported for the first time.

Clinical Features: Two patients experienced paresthesias in all digits of the hands, glove-like numbness of the hands and forearm, weakness (unable to open jars), hand clumsiness, upper extremity coldness, fullness or tightness, deep aching pain, and other signs and symptoms consistent with T4 syndrome. The patients were evaluated using quantitative thermosensory testing and handgrip dynamometry before and after treatment.

Intervention and Outcome: Relief of bilateral arm pain, numbness, and paresthesias occurred after intramuscular injections of 1 to 2 mL of 0.5% bupivacaine at the fourth thoracic paraspinal level. Additional therapy for associated signs and symptoms was provided using an anticonvulsant (gabapentin).

Conclusion: The clinical presentation of the patients reported in this article provides a description and additional information regarding T4 syndrome. (J Manipulative Physiol Ther 2006;29:403-408)

Key Indexing Terms: *Paresthesia; Thoracic Vertebrae; Manipulation, Spinal; Pain Measurement; Gabapentin*

The fourth thoracic (T4) syndrome was first described in chiropractic literature in the late 1950s, but it has only rarely been discussed in the allopathic literature.[1] In this report, we further define the T4 syndrome, describe potential diagnostic tools, and introduce nonmanipulative therapeutic options for this rare condition.

Patients presenting with T4 syndrome experience paresthesias in all digits of the hands, glove-like numbness of the hands and forearm, weakness (unable to open jars), hand clumsiness, upper extremity coldness, a sense of fullness, tightness, and deep aching pain. Other reported symptoms include back pain and stiffness and frequent headaches. Although other chronic pain conditions report sensory dysfunction and pain facilitation, this compilation of observed signs and symptoms seems best identified as a specific syndrome, the T4 syndrome.[2-6]

The 2 patients described in this article are representative of more than 30 patients who presented to a large private pain practice for evaluation of signs and symptoms consistent with T4 syndrome.[7-10]

Methods

Selection of representative patients for this article was accomplished after a review of medical records from a private pain practice. The 2 patients selected for this report demonstrated a compilation of signs and symptoms consistent with T4 syndrome and were representative of the observed response to the used diagnostic and therapeutic interventions.

Thermosensory perception in these patients was completed using the TSA-2001 (MEDOC, Ltd, Minneapolis, Minn), a computerized device used in clinical and research settings for the assessment of small-diameter nerve fiber function.[11-16] Electromyography and nerve conduction testing sample large myelinated fiber function, whereas quantitative thermosensory testing (QST) examines smaller nociceptive, pain and temperature (C and A delta) fiber function. The TSA-2001 is capable of maintaining a linear

[a] President, American Pain Specialists, Grafton, Ohio.
[b] Professor, Department of Emergency Medicine, Medical College of Georgia, Augusta, Ga.
Submit requests for reprints to: Gary A. Mellick, DO, President, American Pain Specialists, PO Box 85, Grafton, OH 44044 (e-mail: *mellickg@msn.com*).
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temperature change through a feedback mechanism. This apparatus uses a Peltier-type thermode that consists of a semiconductor junction containing a temperature sensor controlled by the patient permitting the measurement of thresholds of warming, cooling perception, and thermal (hot and cold) hyperalgesia. The Peltier thermode was placed in contact with the skin at selected thoracic paraspinal dermatomes and distal upper extremities. The method of limits was performed with increasing stimuli, directed from adaptation range toward the sensation range and thermal pain thresholds. Subjects depressed a switch (held in the free hand) at the instant they perceived a specific sensation or upon reaching cold or hot thermal tolerance level. The skin adaptation temperature was a steady 32°C, and stimulator temperature range was 0°C to 50°C. Three readings were obtained at each location and averaged to determine a single threshold score for each side.

The Jamar Hand Dynamometer (JA Preston Corp, Jackson, Mich), a hydraulic device used to evaluate grip strength, was used to document hand weakness as well as therapeutic responses. The Jamar Hand Dynamometer displays isometric grip force from 0 to 200 lb using a dual-scale readout. The peak-hold needle automatically retains the highest reading until reset. All measurements were performed for both dominant and nondominant hands. Subjects performed 3 maximum attempts for each measurement and the average value of these trials was recorded. One-minute rests were given between each attempt, and hands were alternated to minimize fatigue affects. No verbal encouragements were performed.

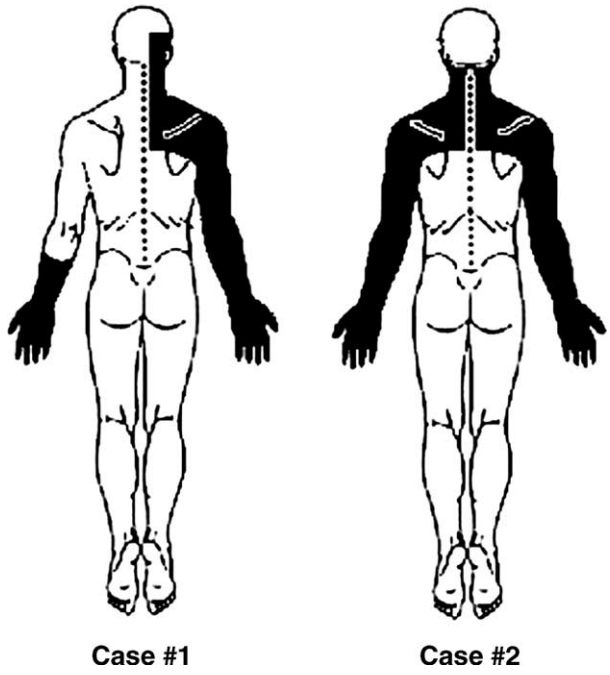

Fig 1. *Distribution of symptoms of 2 flexion-hyperextension injuries. Case 1 represents an injury from the left side and case 2 represents a posterior impact injury.*

Case 1

A 54-year-old female hotel desk clerk was initially seen 1 month after a motor vehicle crash in which her car was hit from the side by a much larger vehicle. She was thrown to the passenger's side striking her head without loss of consciousness. Pain in the head, neck, and shoulders began almost immediately. A cervical spine radiograph series performed in the local emergency department documented the absence of fractures.

When seen for the first time, she complained that her hands felt numb and clumsy. Grasping objects was difficult and she would frequently drop objects from either hand. She described tingling in her arms and all of the digits of both hands. The paresthesias were frequent when driving, at rest, or when lying in bed. She stated that when in bed, her arms and hands felt cold and that the prickling sensation would wake her up at least twice at night. After awakening she would shake her hands out to "wake them up." She described her arm muscles as feeling full, sore, and tight. The bilateral arm pain was worse on the right. Upper back and neck pain was also described and was associated with new-onset occipital headaches and right eye pain that caused difficulty in initiating and maintaining sleep. Previous treatments with naproxen, carisoprodol, and ibuprofen provided minimal relief. A magnetic resonance imaging of the cervical spine showed no abnormalities. Electromyography and nerve conduction study of the upper extremities showed no evidence of neuropathy, radiculopathy, or myelopathy.

The initial neurologic examination showed increased cutaneous sensibility thresholds for pinprick, temperature, and vibration with sensory dysfunction described as 50% worse on the right. Light touch and pinprick of the posterior scalp, right side of the neck, and right shoulder were described as "barely noticeable." Tuning fork vibration perception was greatly reduced over the right hand, arm, and upper back, and awareness of proprioceptive finger movements of the right hand was slightly reduced. Left-sided pinprick and temperature hypoesthesia were noted to extend as far as the mid forearm. She had previously been unaware of the decreased sensory perception in the shoulder, neck, and posterior scalp (Fig 1). Strength testing revealed slight (5−/5) bilateral grasp weakness. The remainder of the neurologic examination was normal including deep tendon reflexes and Babinski's testing. Adson's test for thoracic outlet syndrome and Phalen's and Tinel's tests for carpal tunnel syndrome were negative.

The musculoskeletal examination was positive for limited and painful neck movement. Myofascial pain to palpation was most prominent in the upper left side of the back. The right occipital area and the right carotid