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Thoracic dorsal ramus entrapment

Case report

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✓ Entrapment of the dorsal ramus of a thoracic spinal nerve is described in a patient with chronic back pain and sensory disturbance in the cutaneous territory served by the T3–5 dorsal rami. The dorsal ramus of the T-4 nerve was found to be compressed by a bone spur involving the inferior T-4 apophyseal facet. The point of entrapment was a tunnel bounded by the transverse process, apophyseal joint, rib, and superior costotransverse ligament.

KEY WORDS • **spinal nerve** • **thoracic spine** • **nerve entrapment** • **dorsal ramus**

SPINAL pain may arise in the spinal movement segment including the vertebrae, the intervertebral disc, the intervertebral ligaments, and the deep muscles; in the superficial soft tissue such as muscles, fascia, and skin; and in the spinal roots and nerves. The articular branches of the dorsal ramus of the spinal nerves have been involved in the pathophysiology of low-back pain, and have been the subject of some controversial surgical approaches.[3,4] There are few clinical data concerning the consequences of acute or chronic injury of the dorsal ramus of the spinal nerves.[1,5] The object of this report is to present the clinical and surgical findings in a case of entrapment of the dorsal ramus of a thoracic spinal nerve.

Case Report

This 33-year-old male manual worker was referred to our department in August, 1985, with a chief complaint of back pain. The pain, clearly related to physical activity, was described as an acute unbearable electric-like shock radiating from the interscapular area along the right paraspinal muscles to the neck and right arm. Pain episodes were frequently followed by a severe autonomic response with pallor, sweating, and syncope. Several times the patient fell unconscious, hurting himself. A second kind of pain was described as a continuous unpleasant feeling in the right interscapular area. A diagnosis of epilepsy had been made by a general practitioner, although electroencephalography and cranial computerized tomography (CT) showed no abnormalities and the symptomatology did not change with antiepileptic drugs. The patient denied any prior history of trauma or illness involving the spine.

Examination. Physical examination on presentation demonstrated slight tenderness over the right paraspinal muscles but neurological examination findings were normal. Plain x-ray films and tomograms revealed bone spurs and osteophyte formations at the T3–4, T4–5, and T5–6 apophyseal joints. Metrizamide myelography, spinal CT, and magnetic resonance imaging revealed no abnormalities. Conservative treatment with a general back hygiene protocol, physical therapy, administration of muscle relaxant agents, and transcutaneous electrical nerve stimulation was prescribed, achieving an amelioration of the continuous pain and a reduction in the number of episodes.

In September, 1987, neurological examination displayed an area of hypesthesia with severe painful dysesthesia and hyperalgesia in the cutaneous area over the T3–5 spinous processes extending laterally to the border of the right scapula. The area was covered by lesions produced by the patient scratching himself in an attempt to alleviate his dysesthesia. Psychiatric examination revealed no significant abnormalities. A diagnosis of entrapment of the dorsal rami of the spinal nerves from T-3 to T-5 was made.

Operation. In October, 1987, the patient underwent microsurgical exploration of the dorsal rami from T-3 to T-5 for neurolysis and decompression. A longitudinal midline incision was made and the laminae, transverse processes, and ribs of the T2–5 vertebrae were subperiosteally dissected. The dorsal rami of the T3–5 spinal

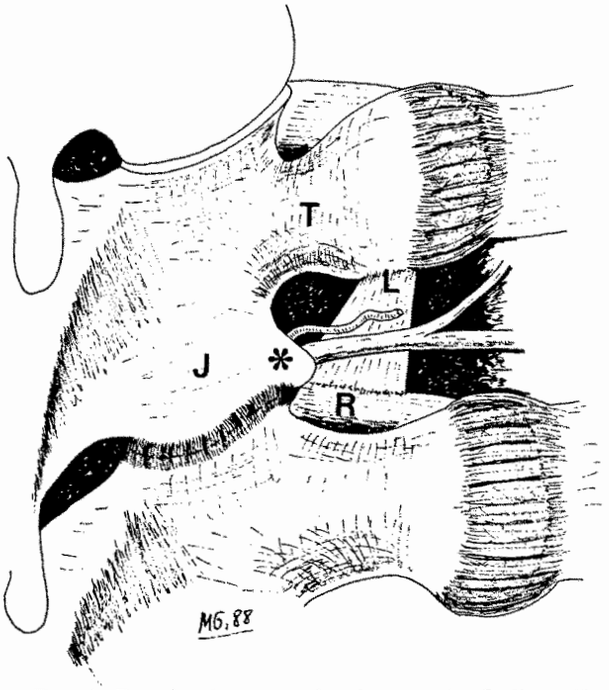

FIG. 1. Drawing demonstrating the operative findings. The dorsal ramus of the T-4 spinal nerve is entrapped by a bone spur *(asterisk)* from the inferior facet of the T-4 vertebra in an osseofibrous tunnel bounded by the transverse process (T), apophyseal joint (J), rib (R), and superior costotransverse ligament (L).

nerves were then identified emerging below the transverse processes lateral to the apophyseal joints where they ran for a few millimeters before dividing into medial and lateral branches and entering the erector spinae muscles. At the T4–5 level a bone spur involving the inferior T-4 apophyseal facet was found compressing the T-4 dorsal ramus (Fig. 1). The margins of the ribs, transverse processes, and apophyseal joints were removed and the superior costotransverse ligaments severed, providing adequate nerve decompression and allowing exposure of the parent intercostal nerve.

Postoperative Course. The patient had an uneventful postoperative course. Neurological examination immediately after surgery showed total relief of the dysesthesias and hyperalgesia, but some degree of hypesthesia persisted. Six months after surgery the patient is doing well with no recurrence of the preoperative symptoms.

Discussion

According to Sunderland,[5] the potential sites of dorsal ramus entrapment are the intervertebral foraminae, the passage of the nerve near the capsula of the apophyseal joints, and the passage of the cutaneous branches through the back muscles and fascia. In our patient, the entrapment was at the second point, an osseofibrous tunnel bounded superiorly by the transverse process, medially by the apophyseal joint with its capsula and ligaments, inferiorly by the rib, and laterally by the superior costotransverse ligament which extends from the neck of the rib to the inferior rim of the upper transverse process.[2] In this region the nerve may be chronically injured by pathological changes involving the joint, including inflammatory swelling and osteophyte formation.[5] Here the nerve is accompanied by a branch of the intercostal artery and its satellite veins; a few millimeters further on, each dorsal ramus divides into medial and lateral branches.[2,5] At the upper thoracic levels, the medial branches give off cutaneous fibers to serve a cutaneous sensory territory extending from the midline to a line which follows the outer border of the trapezius muscle and the inner border of the scapula.[5]

Symptoms of peripheral nerve entrapment include paresthesias and/or pain in the cutaneous area served by the nerve and weakness of the innervated muscles. However, apart from carpal and occipital tunnel syndromes, pain is not usually the main symptom as in our case. The differential diagnosis of dorsal rami entrapment includes spinal column tumors or infection, dural arteriovenous fistula, facet abnormalities, and myofascial pain; however, the demonstration of sensory abnormalities in the anatomical distribution of the dorsal ramus leads to the correct diagnosis. The sensory abnormalities were extended throughout the T3–5 area, but only the T-4 ramus was found to be clearly entrapped. A less obvious entrapment of the T-3 and T-5 rami was relieved by microsurgical decompression. A considerable degree of sensory overlap among dorsal rami or central disturbances of spinal cord neuronal activity, generated by the chronic incoming pain impulses spreading to excite neighboring cord segments, may explain these clinical findings.

References

1. Bogduk N: Lumbar dorsal ramus syndrome. **Med J Aust 2**:537–541, 1980
2. Johnson RM, Southwick WO: Surgical approaches to the thoracic spine, in Rothman RH, Simeone FA (eds): **The Spine, ed 2.** Philadelphia: WB Saunders, 1982, pp 147–171
3. Rees WES: Multiple bilateral subcutaneous rhizolysis of segmental nerves in the treatment of the intervertebral disc syndrome. **Am Gen Pract 26**:126–127, 1971
4. Shealey CN: Percutaneous radiofrequency denervation of spinal facets. **J Neurosurg 43**:448–451, 1975
5. Sunderland S: **Nerves and Nerve Injuries, ed 2.** Edinburgh: Churchill Livingstone, 1978, pp 1021–1031

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