

Effects of lumbar sympathetic ganglion block for a patient with amyotrophic lateral sclerosis (ALS)

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Abstract A 59-year-old man with amyotrophic lateral sclerosis (ALS) received lumbar epidural and sympathetic ganglion blocks to increase regional blood flow and improve his clinical symptoms. After a lumbar epidural block (0.5% mepivacaine), the skin temperature of his affected lower extremities rose by 7.0°C and became close to that of the intact side, and the distance he was able to walk with his cane increased from 2 to 8m. The clinical effects produced by the lumbar sympathetic ganglion block (99.5% alcohol) were sustained for approximately 8 weeks after the first block and for approximately 6 weeks after the second block. There were no particular adverse effects or complications associated with these nerve block procedures. Epidural and sympathetic ganglion blocks for an ALS patient, albeit their effects are of a transient nature, may improve related clinical symptoms, and were thought to play a contributory role in improving our patient's quality of life.

Key words Amyotrophic lateral sclerosis · Epidural block · Sympathetic ganglion block · Muscle weakness · Temperature

Introduction

Amyotrophic lateral sclerosis (ALS) is a progressive disease of unknown cause, in which motor neurons are systematically damaged, and there is currently no effective treatment for this disorder [1]. Here, we report that lumbar epidural and sympathetic ganglion blocks improved weakness of the lower extremity, with a rise in its skin temperature, in an ALS patient.

Case report

A 59-year-old man who was 158cm in height and 58kg in weight visited our outpatient clinic. His past and fam-

ily histories were unremarkable. As for the history of the present illness, since April 1995 he had been aware of weakness in the left lower extremity and had difficulty in walking. In June, with a complication of the onset of decreased muscle strength, the patient visited the Department of Orthopedic Surgery. However, no particular abnormalities were found. In July, following a visit to the Department of Internal Medicine, Neuropathology, a diagnosis of ALS was made, on the basis of observed clinical symptoms and electromyographic findings. Without any particular effective treatment, the patient's pathologic state gradually progressed, and in October, he became wheelchair-bound due to the progression of difficulty in walking, and was forced to retire from his work.

At the time of the initial observation at the Department of Anesthesiology, in February 1996, the muscle strength of the left upper and lower extremities was seen to be decreased and the deep reflex was diminished. The patient was walking with a cane and he soon became tired and required a rest after walking 2 to 3m at home. There were no signs of numbness, pain, or sensory abnormalities. Further, the patient's speech and swallowing were intact. His muscle weakness was exacerbated by lower ambient temperature and rainy weather. On the other hand, after taking a bath, his distress was transiently relieved. His score on the Amyotrophic Lateral Sclerosis Severity Scale (ALSSS) [2], was found to have worsened from 38 to 29 points during the 7-month period prior to February 1996. On thermography, a decrease in the temperature of the whole left lower extremity differing from the right side by 3°C to 7°C was shown (Fig. 1a,c). There were no signs of vascular disease, such as atherosclerosis, or of lumbar spinal cord disease, such as lumbar spinal canal stenosis.

In anticipation of symptomatic improvement in the lower extremities that would be brought about by an increase in the blood flow, a lumbar epidural block (at

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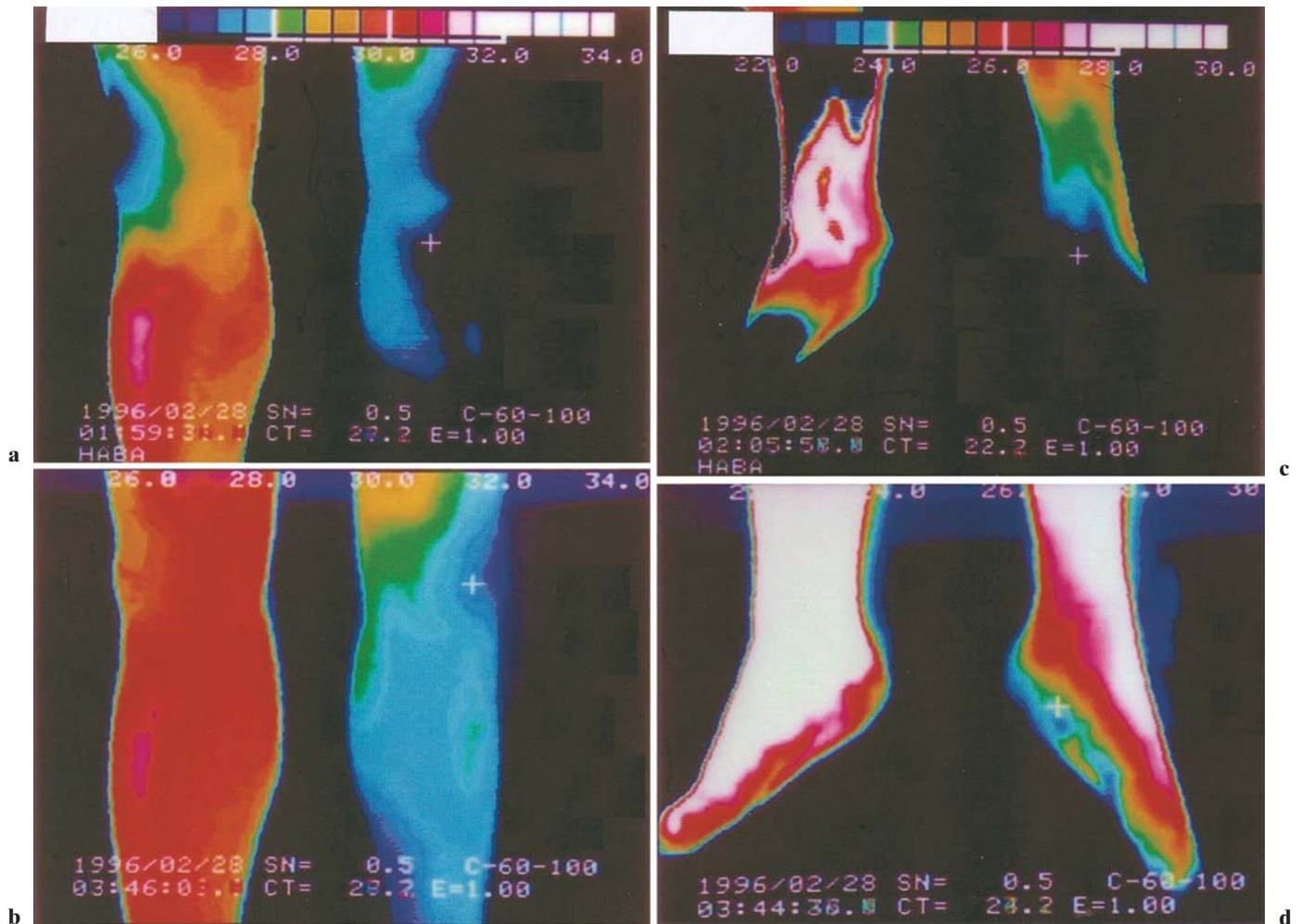


Fig. 1. Frontal view thermograms of bilateral lower extremities before (**a, c**) and after (**b, d**) the initial epidural block (at the L2/3 level, 10ml 0.5% mepivacaine). Reduced temperature in the whole left lower extremity is noted, with the temperature difference from the right side (the intact side) being

of 3°C to 7°C (**a, c**). After the epidural block (**b, d**), a temperature rise in the whole left lower extremity is noted, with the temperature difference from the right side reduced to 0°C to 2°C

L2/3, 10ml 0.5% mepivacaine) was performed; as a result, a rise in the temperature of the whole left lower extremity was registered thermographically and the difference in temperature from the right side was small (0°C to 2°C; Fig. 1b,d). As regards clinical symptoms, during the 24h after the block, the movement of his lower extremities became less restrictive, and an increase in the distance that he could walk (from 2 to 8m, with his cane) was noted. The patient underwent lumbar epidural block a total of 11 times between February and April. Following these procedures, on April 5, 1996, a lumbar sympathetic ganglion block (at L1/2, transintervertebral disk approach, 10ml 99.5% alcohol) was performed under fluoroscopic guidance. Immediately after the nerve block, the temperature of the left lower extremity rose by a maximum of 13.0°C. The pulse wave of the left second toe was significantly in-

creased simultaneously, and the difference from the right side on the toe plethysmograph was nil, indicating the nerve block had induced vasodilation in the dorsalis pedis and posterior tibial arteries. As for clinical symptoms, the distance that he could walk with his cane increased to approximately 10m and his easy fatigability experienced on walking was also ameliorated. These improvements in the symptoms and the increased temperature of the lower extremities were sustained for more than 6 weeks (Fig. 2). However, 8 weeks after the nerve block, these improvements produced by the nerve block had disappeared. Therefore, a second lumbar sympathetic ganglion block (at L1/2 and L2/3, transintervertebral disk approach, 10ml × 2 of 99.5% alcohol) was performed under computed tomography (CT) guidance. A rise in the temperature of the left lower extremity (approximately 8°C) and symptomatic

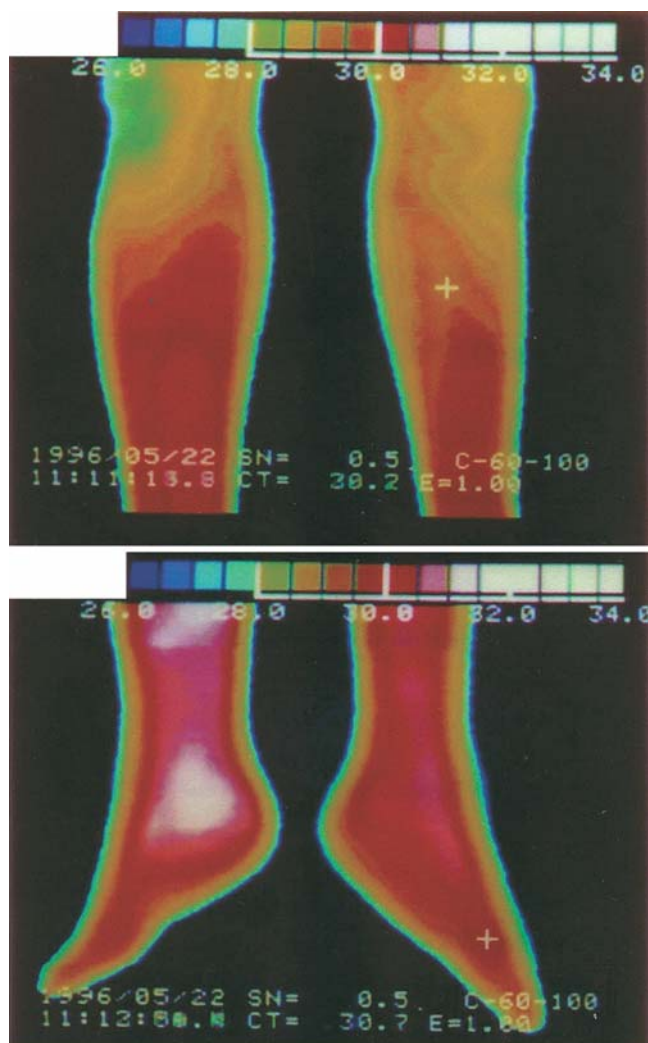


Fig. 2. Frontal view thermogram at 6 weeks after the first lumbar sympathetic ganglion block. A temperature rise in the left lower extremity, by a maximum of 13°C, is noted, with the temperature difference from the right side being nil

improvement were again attained, and approximately 1 month after this procedure, the patient was released to another hospital. His ALSSS had decreased to 23 points at this time.

Subsequently, although the patient's symptoms gradually progressed and he had dyspnea associated with respiratory muscle paralysis, he did not wish to be given treatments such as tracheotomy or artificial respiration, and he died approximately 9 months after being transferred to the other hospital.

Discussion

There is currently no effective treatment available for ALS, and sufferers are eagerly waiting for the advent of

some routine treatment for this disorder. Although some reports have described the use of epidural anesthesia applied for the purpose of minimizing the dosage of nondepolarizing muscle relaxants [3,4], few such reports of nerve block techniques aiming at the recovery of muscle strength and the alleviation of easy fatigability have been made [5]. Further, there have been no reports in the literature about lumbar sympathetic ganglion block, utilizing alcohol, for ALS. Terauchi [5] reported that continuous epidural block, using dibucaine, produced transient improvements in muscle strength and alleviation of bulbar paralytic symptoms in about two-thirds of a total of 21 patients with neuromuscular disorder and progressive muscular atrophy.

In view of our present patient's muscle weakness being exacerbated by lower ambient temperatures and rainy weather and being relieved after taking a bath, some symptomatic improvement was anticipated to be produced by an epidural block. After the lumbar epidural block using 0.5% mepivacaine, the skin temperature of the affected lower extremity increased, becoming closer to that of the intact side. Along with this phenomenon, the patient had improved muscle strength, his easy fatigability was alleviated, and the distance he could walk was increased. In subjects who undergo repetition of a single epidural block, there is the possibility of encountering adverse effects, such as hypotension, nausea, dizziness, transient dyspnea, urinary disturbance, chest tightness, and purulent meningitis. Our patient had wished to be treated on an outpatient basis without having to be hospitalized for a continuous epidural block, in anticipation bringing about a long-term effect with a single treatment procedure, we attempted a lumbar sympathetic ganglion block, using alcohol. As a result of this procedure, the observed increase in skin temperature and improvement in clinical symptoms were sustained for approximately 8 weeks after the first block and for approximately 6 weeks after the second block. There were no particular adverse effects associated with these nerve block procedures.

The underlying mechanism through which the improvement of muscle strength was induced via the increased regional blood flow induced by the epidural and sympathetic ganglion blocks remains unknown. There is a report that, in ALS patients, muscle sympathetic nerve activity (MSNA) is increased at an early stage of the disorder [6]. As well as the damage to the motor neurons, the sympathetic nerves are also damaged, and, regardless of the severity of muscle loss, it is held that MSNA is increased in ALS patients [7]. Skin sympathetic nerve activity is also increased in ALS patients [8], and these increased activities are possibly related to a decrease in the skin temperature and in the blood flow in these patients. Therefore, the blockade of these increased sympathetic activities by epidural and sympa-

thetic ganglion blocks may be involved in the improvement of the muscle strength.

The present treatment procedure has no impact on the process of ALS per se and is considered to have no ability to suppress the progression of the disorder. As shown in this patient, the efficacy of these blocks appears to last for several weeks after the procedures. The widespread impairment of autonomic function in ALS, as well as further muscle weakness due to progression of the disease, may have been involved in the disappearance of the beneficial effects after the lumbar sympathetic ganglion block. The treatment procedure, therefore, is considered most effective if it is given at the time that quadriplegia (paraplegia in particular) is manifested, prior to the onset of bulbar paralytic symptoms and dyspnea.

In conclusion, epidural and sympathetic ganglion blocks in ALS patients, albeit their effects may be a transient nature, may improve related clinical symptoms and may play a contributory role in encouraging the patients' desire for rehabilitation, and in improving their quality of life.

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