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Short communication

Long-term effect of repeated lidocaine injections into the external oblique for upper camptocormia in Parkinson's disease

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ABSTRACT

Background: Parkinson's disease (PD) is occasionally complicated by camptocormia. In a previous study, we classified camptocormia into upper and lower types based on the inflection point, and reported that lidocaine injection into the external oblique muscle, but not into the internal oblique or rectus abdomen, improved upper camptocormia in PD. The effect of a single lidocaine injection disappeared over a period of few days. In this study, we used repeated lidocaine injections into the external oblique for 4–5 days and evaluated the effects of such treatment for up to 90 days.
Methods: The study subjects were 12 patients with PD and upper camptocormia who were treated with repeated lidocaine injections into the bilateral external oblique followed by rehabilitation. The effect of treatment was evaluated by measuring the angle of truncal flexion before and after the injection. Patients who showed improvement with repeated injections were evaluated during a 90-day period.
Results: Eight out of 12 patients showed significant improvement in posture after a single lidocaine injection. However, the effect subsided several days after treatment. Repeated injections produced long-term improvement in 9 out of 12 patients, which was maintained during the 90-day observation period in eight of these patients.
Conclusions: Our results showed that repeated lidocaine injections into the external oblique improved upper camptocormia, and that the effect was maintained in the majority of patients during the 90-day observation period, indicating that repeated lidocaine injections into the external oblique have therapeutic effect on upper camptocormia in patients with Parkinson's disease.

1. Introduction

Camptocormia (from the Greek *kamptos* or to bend, and *kormos* or trunk) is defined as an abnormal thoracolumbar flexion that appears on standing or walking but disappears in the supine position. There is a strong relationship between camptocormia and Parkinson's disease (PD) [1]. The possible causes of camptocormia include myopathy, myositis [2], and truncal dystonia [1]; however, the exact etiology of camptocormia in PD has not been determined. In camptocormia, several flexion patterns exist, which include bending at an upper position or hip joint and scoliosis or rotation of the trunk. However, there is little information on these classification patterns of camptocormia. In a previous study, we categorized camptocormia into upper and lower types and showed that lidocaine injection into the external oblique (EO) muscle, but not into the internal oblique or rectus abdomen, improved posture in PD patients with upper camptocormia [3]. We also reported that the effect of single lidocaine injection disappears over several days [3]. Our results support the notion that dystonia in the EO is involved in the pathogenesis of upper camptocormia [3]. In this study, we confirmed the effects of a single lidocaine injection and evaluated the effect of repeated lidocaine injections into the EO in upper camptocormia for patients with PD.

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2. Methods

2.1. Classification of camptocormia

Camptocormia was clinically categorized by our group into upper and lower types based on spinal inflection points [3]. Based on X-ray images of the spine, upper camptocormia was defined as abnormal truncal flexion at a point between the lower thoracic and upper lumbar vertebrae, while lower camptocormia represented truncal flexion at the hip joint.

2.2. Patients

PD patients with upper camptocormia (flexion angle >40°) received single and repeated lidocaine injections into the EO between December 2010 and July 2011, and followed for a 90-day period. Patients were diagnosed with PD according to the United Kingdom Parkinson Disease Society Brain Bank criteria. Patients with severe spondylosis associated with kyphosis or other similar conditions arising from truncal muscle weakness were excluded in this study.

Twelve patients (8 women and 4 men, age: 72.8 ± 6.0, mean ± SD, PD duration: 10.0 ± 7.7 years, Hoen & Yahr stage: 3.6 ± 0.7) were included in this study. All patients showed some resistance to passive truncal extension and complained of stiffness and pain in the upper abdomen. The wearing-off phenomenon was noted in 4 patients, and treatment with anti-Parkinson medications in these patients partially corrected upper camptocormia in two patients. The inflection points were located between Th10 and L2 on the spinal X-ray images. Primary pathologies that could affect the paraspinal muscles and potentially explain upper camptocormia (e.g., myopathy or myositis) were evaluated by neurological examination, needle electromyography (EMG), muscle computed tomography (CT), and magnetic resonance imaging (MRI). Although muscle CT showed moderate paraspinal atrophy in 3 patients, and MRI T2-weighted images showed hyperintensity of the paraspinal muscles in one patient, none of the patients showed truncal extension weakness or myogenic response on needle EMG.

The study was approved by the ethics committee of the National Center of Neurology and Psychiatry (NCNP), and informed consent was obtained from all participants.

2.3. Measurement of upper camptocormia flexion angle

The angle of the upper camptocormia was defined as the angle formed between a line perpendicular to the ground and a line linking the C7 vertebra with the inflection point of the trunk (Fig. 1) [3]. The inflection point was defined as the point most distant from another line between C7 and L5. Truncal flexion angle was also measured in 7 age-matched PD patients free of camptocormia (flexion angle: 29.4 ± 3.7°).

2.4. Lidocaine injection and rehabilitation

Lidocaine (50 mg of 1% xylocaine®, Astrazeneca, Japan) was injected in the bilateral EO muscles under ultrasound guidance. A single injection was used first and then repeated lidocaine injections (once a day for 4–5 days) in all patients. Repeated injections were commenced after diminishment of improvement following a single injection or at 2 weeks when improvement following a single injection was maintained or after few days when a single injection failed to induce improvement. The upper camptocormia flexion angle was measured prior to injection, one day after single injection, and three days after repeated injections. Flexion angles were measured during the on-state in four patients who had the wearing-off phenomenon. Patients showing improvement with repeated injections were followed-up for 90 days. In addition, all patients were trained to perform regular daily rehabilitation program that emphasized on truncal extension, during and after repeated injections. Anti-Parkinson drug use was not changed prior to or after the injections.

2.5. Statistical analysis

Values were reported as mean ± standard deviation. Differences in flexion angles prior to and after a single or repeated injections were analyzed using the Wilcoxon signed rank test. A p value < 0.05 was considered statistically significant. To analyze the effect of repeated injections of lidocaine during the 90-day observation period, we calculated the rate of improvement in the flexion angle. For this purpose, the rate measured at 3 days after repeated injections relative to the baseline was considered 100%. Thus, the following equation was used to calculate the improvement rate: Improvement rate (%) = [(flexion angle at baseline − flexion angle at time x)/(flexion angle at baseline − flexion angle at 3 days after repeated injections) × 100].

3. Results

Upper camptocormia improved in 8 out of 12 patients (66.7%) after single injection with lidocaine. The mean camptocormia flexion angle decreased from 62.1 ± 13.4° to 54.0 ± 16.8° ($p = 0.018$;

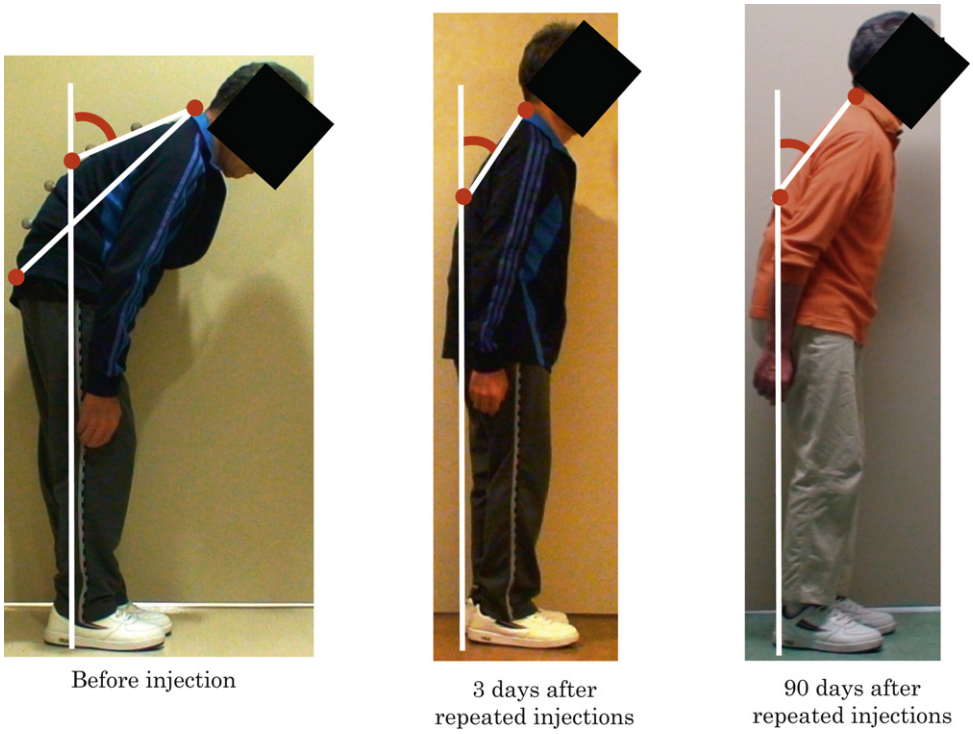

Fig. 1. Measurement of upper camptocormia flexion angle and time course of camptocormia in a representative patient. Patients were instructed to stand during evaluation without exerting any effort. In this patient, the camptocormia flexion angle decreased from 65 to 32° after repeated injections of lidocaine and the improvement was maintained over the 90-day observation period.