A Senile Case of Late-onset Pompe’s Disease

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Abstract

A 72-year-old, seemingly healthy, Japanese man suddenly lost consciousness. At the emergency room, the patient’s Glasgow coma scale score was 10 and a thoracic breathing pattern was observed. An arterial blood gas analysis indicated acute hypercarbic respiratory failure. He was placed on non-invasive positive pressure ventilation. The next day he was alert. Manual muscle testing revealed that his face, neck and limb muscle strength were normal. He could walk, and Gowers’ sign was not observed. Computed tomography showed atrophy of the paravertebral, abdominal wall and diaphragm crura muscles, without apparent limb muscle involvement. Pompe’s disease was diagnosed based on the results of biochemical and genetic tests for acid alpha-glucosidase.

Key words: myopathy, diaphragm crura, acid alpha-glucosidase, respiratory muscle

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Introduction

Pompe’s disease is an inherited disease caused by acid alpha-glucosidase (GAA) deficiency. Now that enzyme replacement therapy (ERT) is available, its diagnosis is more crucial than ever before. Late-onset Pompe’s disease (LOPD) is a progressive myopathy that is characterized by limb-girdle and respiratory muscle weakness (1). We herein describe the case of an elderly Japanese man who presented with sudden carbon dioxide (CO2) narcosis. An unexpected diagnosis of LOPD was made based on the trunk computed tomography (CT) findings.

Case Report

A 72-year-old Japanese man was relaxing at home after delivering milk when he suddenly lost consciousness. According to his wife, he was totally unresponsive for approximately 10 minutes. When the ambulance arrived, he barely could open his eyelids or say his name. His oxygen saturation (SO2) was 89%, and he was given oxygen (O2) at a rate of 3 L/min. Later in the emergency room, his consciousness was still impaired. His Glasgow coma scale score was 10 (E2V4M4). His blood pressure was 151/91 mmHg, his heart rate was 112 beats/min, and his body temperature was 36.4°C. The observation of his respiration revealed a thoracic breathing pattern (rate, 20 breaths/min). An arterial blood gas (ABG) analysis revealed the following: pH 7.098, pCO2 163.8 mmHg, pO2 144.5 mmHg, and SO2 97.5%, indicating acute hypercarbic respiratory failure. The results of other blood tests were unremarkable, including the patient’s creatine kinase (CK) level, which was 192 IU/L (normal, 50-230). Head magnetic resonance imaging disclosed no relevant abnormalities. Chest roentgenography and CT showed no lung abnormalities, but the elevation of the left diaphragm suggested diaphragmatic dysfunction (Figure A, B). He was placed on non-invasive positive pressure ventilation (NPPV) without O2 supplementation. The next day he was alert, and his ABG results showed improvement: pH 7.34, pCO2 89.3 mmHg, pO2 71.4 mmHg, and SO2 92.3%. Thereafter, the use of NPPV gradually became intermittent.

In childhood, the patient ran faster than his friends. In high school, he did well as a member of a volleyball club, but could not perform sit-ups. He had suffered from lower back pain since he was approximately 20 years of age. He was on medications for hypothyroidism that had been diagnosed at a health check 7 years prior to his admission. One week before admission, he received local anesthetic injec-
Figure. A chest roentgenogram of the patient (A) shows no lung field abnormalities but reveals the elevation of the left diaphragm (arrow in A). Chest CT with a lung window setting (B) shows no lung abnormalities. On a mediastinal window setting, chest CT (C) shows severe paravertebral muscle atrophy (arrow in C), in comparison to an age-matched normal control (arrow in D). Upper-abdominal CT (E) and an extended image of the region of interest (G) in the patient show that the diaphragm crura (arrows in G) are very thin, in comparison to the age-matched normal control (F and H). Mid-abdominal CT (I) shows a severe atrophy of the abdominal wall (arrow in I) and lumbar paravertebral muscle (double arrow in I), while the psoas muscle is relatively spared (arrow head in I), in comparison to the age-matched normal control (J). The gluteal, thigh and leg muscles of the patient (K, M, O) are relatively spared in comparison to the age-matched normal control (L, N, P).

tions around his left shoulder due to shoulder pain.

The results of a physical examination several days after admission were as follows. He was 170 cm tall and weighed 51 kg (body mass index, 17.64). His cognitive function was normal. Phonation and swallowing were intact. Neither myotonia nor sensory disturbances were observed. His breathing was paradoxical, and his forced vital capacity was 67%.

A review of the chest CT scan obtained at admission revealed paravertebral muscle atrophy on the mediastinal window setting (Figure C and E), in comparison to an age-matched normal control (Figure D and F). A whole body CT was obtained. His diaphragm crura (Figure G) were very thin in comparison to the age-matched normal control (Figure H). His lumbar paravertebral and abdominal wall muscles (Figure I) were also severely atrophic in comparison to the age-matched normal control (Figure J). However, his psoas (Figure I), gluteal (Figure K), thigh (Figure M), and leg (Figure O) muscles were relatively preserved in comparison to the age-matched normal control (Figure J, L, N and P). A dried blood spot test showed deficient GAA activity (2), and the level of GAA in the patient’s lymphocytes decreased to 1.49 nmol/mg protein/h (normal, 30.7±10.3). LOPD was diagnosed on the basis of these findings. A GAA gene analysis revealed compound heterozygous mutations with a splice site mutation of G546T and a missense mutation of T1099G (Trp367Gly).

ERT was initiated. At the present time, he has been independent in his daily activities at home for approximately one and a half years; however, he intermittently receives NPPV.

Discussion

The first complaints of LOPD usually start before 40 years of age, and are mostly related to limb-girdle weakness, however, some patients require artificial ventilation while they are able to walk (1). To our knowledge, there have been no other case reports in which complaints of LOPD started after 70 years of age. Thus the patient of the present case is atypical in that he was 72 years of age and
his manifestations included acute respiratory failure without proximal muscle weakness. The clue to the diagnosis of LOPD was the observation of paravertebral muscle atrophy on CT, which has been well demonstrated in LOPD (3); however, it has also been described as an age-related physiological phenomenon (4). The abdominal wall muscle atrophy (5) and the very thin diaphragm crura (6) that were observed in this patient have been reported to be correlated with respiratory failure in LOPD. Although it remains to be established whether these findings are specific to a diagnosis of LOPD, their combined presence in the present patient led us to strongly suspect LOPD. The patient’s enzyme activity was directly tested because, in some cases, LOPD cannot be diagnosed based on muscle pathology (7).

Retrospectively, his disease seems to have started before he joined his high school volleyball club after which it worsened to a considerable extent. His sudden respiratory decompensation might have been precipitated by the anesthetic injections to his left shoulder muscles, which are an important component of the thoracic breathing muscles when the diaphragm does not work.

This case extends the clinical spectrum in which LOPD should be considered because it can manifest as sudden respiratory failure in an otherwise healthy elderly individual without an increase in the serum level of CK or apparent limb muscle involvement. This manifestation may have been related to the patient’s advanced age. Trunk CT findings can be very useful in diagnosing LOPD in patients with atypical forms of the disease.

The authors state that they have no Conflict of Interest (COI).

References


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