

or focal symptoms were shown, we carried out magnetic resonance imaging of the head and a brain abscess in the left caudate nucleus (Fig. 1c,d) was detected. After the antibiotic agent was changed to cefotaxime, which could migrate to the central nervous system, the patient's fever resolved and the inflammatory reaction was reduced. However, even after the continuous administration of intravenous antibiotics for several weeks, the size of the brain abscess on magnetic resonance imaging worsened, and oral administration of moxifloxacin was added. During the course, his blood glucose levels were strictly controlled by insulin or oral antidiabetic agents. After switching to oral administration of moxifloxacin alone, the patient was discharged on the 75th day.

hvKP forms multiple abscesses throughout the body from liver abscesses, and this condition is called "invasive liver abscess syndrome." In particular, endophthalmitis and central nervous system infections are often severe and difficult to treat.^{1,2} hvKP has been reported in East Asia, including Taiwan; however, there have been limited reports in Japan.^{3,4} hvKP has a strong capsule owing to the excessive production of mucopolysaccharides. In particular, serotype K1 and K2 strains are highly pathogenic,⁵ which are related to the *mag A* and *rpm A* genes.⁶ It is difficult to carry out genetic testing in community hospitals; however, the string test is useful for screening hvKP with a sensitivity and specificity of 90%.⁷ In this case, the string test was positive, and genetic testing later showed that the genotypes were *mag A* and *rpm A*.

Caution is required in elderly patients, as in this case, as they are less aware of the typical symptoms of infection, which might delay the detection of the disease.⁸ The average age of patients with hvKP in Japan is 69 years.³ In addition, patients with diabetes mellitus are more susceptible to severe infections owing to their impaired immunity and lack of subjective symptoms.⁹ Reports from various countries have shown that diabetes mellitus is the most common risk factor for hvKP, with 63% of patients in Taiwan, 38% in Korea and 29% in the USA.¹ Strict glycemic control is required to prevent the development of metastatic complications.¹⁰

In summary, we report a case of hvKP-associated invasive liver abscess syndrome. HvKP infection requires aggressive systemic search for abscesses in elderly patients with diabetes, including magnetic resonance imaging of the head, regardless of the presence or absence of symptoms. Strict control of blood glucose levels is important to prevent metastatic complications in patients with diabetes mellitus.

Disclosure statement

The authors declare no conflict of interest.

Coronavirus disease 2019-associated worsening and improvement of ataxia and gait in a patient with multiple system atrophy

Dear Editor,

Patients with Parkinson's disease (PD) are reported to experience worsening of motor and non-motor symptoms with severe acute

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system atrophy (MSA) presenting with COVID-19-associated worsening of his neurological symptoms and improvement to his baseline neurological status.

A 64-year-old man initially visited the movement disorders clinic for evaluation of progressive gait difficulty that developed over the past year. On neurological examination, mild saccadic hypermetria and dysarthria were noted. A mild postural tremor was seen in bilateral upper extremities. Rigidity and bradykinesia were present in all limbs, with the latter slightly more prominent in the right upper and lower extremities. Limb ataxia was present on performing finger-to-nose and heel-to-shin, of which the latter was found to be more prominent. Although the patient was found to have a moderate degree of postural instability, he was able to ambulate independently. A review of systems was positive for urinary incontinence and dizziness, and his orthostatic vital signs were later confirmed to meet the criteria for orthostatic hypotension. His past medical history was positive for hypertension, diabetes mellitus and atrial fibrillation. Axial T2-weighted images of brain magnetic resonance imaging showed the hot cross bun sign and pontocerebellar atrophy (Fig. 1a,b). Dopamine transporter imaging showed a dopaminergic deficit most prominent in the left putamen (Fig. 1c). According to the current diagnostic criteria for MSA, we concluded that the patient had probable MSA of the cerebellar type.²

One month later, the patient was admitted to Soonchunhyang University Seoul Hospital in Seoul, South Korea for

rapid worsening of his neurological symptoms, including slurred speech, clumsiness and gait difficulty, developing over the past week. He was initially started on levodopa/benserazide 100/25 mg/day, for possible symptomatic benefit. The patient was admitted for further observation and on the day of admission, developed a fever of 38.1°C with mild respiratory symptoms, including dyspnea, cough and sputum. Real-time reverse transcription polymerase chain reaction test for the qualitative detection of nucleic acid from SARS-CoV-2 was carried out on the patient's nasopharyngeal and oropharyngeal swab specimens, and were found to be positive. High-resolution computed tomography scan of the chest showed multifocal patchy lesions in bilateral lungs (Fig. 1d), compatible with findings of COVID-19. The COVID-19 infection itself was only mild, both clinically and radiologically. The patient was briefly put on 3 L of oxygen (through nasal prong), with an oxygen saturation level of 96~97%. He was given daily intravenous remdesivir 100 mg/day for 5 days and dexamethasone 6 mg/day for 10 days. Although the patient's respiratory symptoms gradually improved over the course of a month, his neurological symptoms, including dysarthria, limb ataxia and gait ataxia with postural instability, were found to worsen in the first 2 weeks. Features of parkinsonism including rigidity and bradykinesia were found to be relatively unchanged. He could neither stand nor even walk with assistance during this period while he received treatment for COVID-19. However, the patient's neurological status was found to gradually

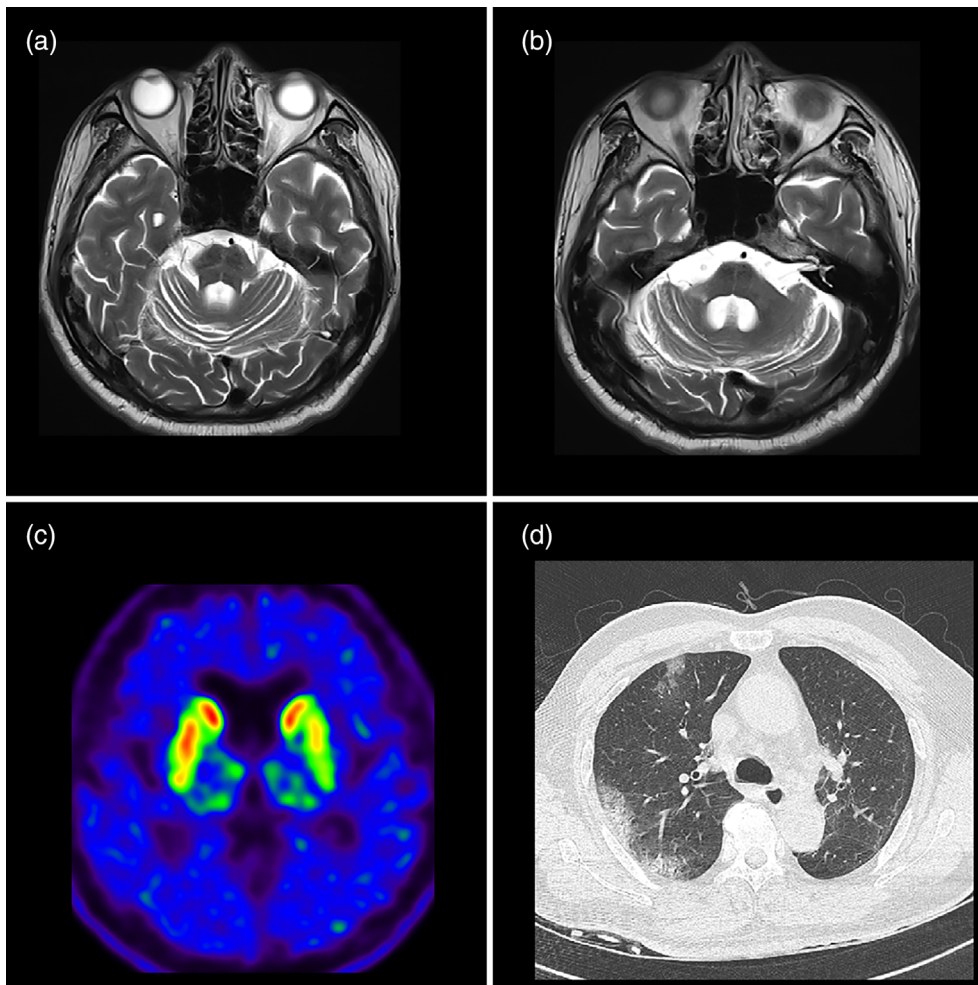


Figure 1 Radiological findings of the patient. Axial T2-weighted images show (a) pontocerebellar atrophy, the hot cross bun sign, middle cerebellar hyperintensities and (b) dilation of the fourth ventricle. (c) Dopamine transporter imaging shows significant striatal dopaminergic depletion, most prominent in the left putamen. (d) High-resolution computed tomography of the chest shows multifocal ground-glass opacities and consolidations most notable in the right lung.

improve to baseline, and he was ultimately discharged 6 weeks after admission.

All procedures performed were carried out in accordance with national law and the Helsinki Declaration of 1964 (in its present revised form). Informed consent was obtained from the patient.

To the best of our knowledge, this is the first documented report of a patient with MSA infected by SARS-CoV-2. Initially, abrupt worsening of his neurological symptoms with COVID-19 were concerning, as a recent report suggested that COVID-19 in patients with PD might result in poor prognosis, such as rapid clinical decline leading to sudden death.³ A report of a patient with PD with only mild COVID-19 related abnormalities on chest computed tomography was found to result in a fatal course. However, we found the present patient with MSA to experience only mild respiratory symptoms, and undergo only transient worsening and return to baseline neurologically. Therefore, based on the present case, we presume that COVID-19 itself does not appear to lead to long-lasting worsening motor symptoms in MSA. Furthermore, the present case suggests that the prognosis of parkinsonian patients infected with COVID-19 might vary. It remains unclear whether such a difference of clinical outcomes in PD and MSA is due to primary brain pathology or secondary pathology as a result of COVID-19 infection. Therefore, more reports are required to address this issue.

The current case suggests that clinicians should consider the possibility of SARS-CoV-2 infection when patients with parkinsonism present with acute worsening of their motor symptoms. To date, little is known about the precise mechanism of how COVID-19 could induce such worsening. One possibility is that infection could accelerate the pathology of alpha-synucleinopathies.⁴ However, the present patient only showed transient worsening of neurological symptoms, giving rise to the possibility of factors such as psychological stress or reduced physical activity as a cause.⁵ The present case might provide clinicians with an initial glimpse into the association between COVID-19 and multiple system atrophy. Future observations regarding worsening of neurological symptoms and signs in PD and MSA are required in this era of COVID-19 pandemic.

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Disclosure statement

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RESEARCH STUDIES

Preparedness guide for people with dementia and caregivers in COVID-19 pandemic

Dear Editor,

With the global pandemic of the novel coronavirus disease 2019 (COVID-19), people with dementia (PWD) are reported to have higher morbidity and mortality than those without dementia.^{1–3} The government of Japan has called on its citizens to implement measures to restrict the spread of COVID-19, such as refraining from going out and avoiding the “Three Cs,” namely, “Closed spaces with poor ventilation,” “Crowded places with many people nearby” and “Close-contact settings.” However, there are many issues regarding COVID-19 restrictions on PWD.

First, PWD may have difficulty understanding and following infection control measures because of their cognitive impairment and behavioral and psychological symptoms of dementia (BPSD).^{4,5} Second, COVID-19 infection may present with atypical signs and symptoms in older people, which may reduce the chances of early detection and treatment. It is particularly problematic for older PWD because they may not be able to complain about their symptoms clearly. Third, restriction measures for COVID-19 may have adverse effects on the PWD. They need support from caregivers and long-term care insurance services to meet their daily needs and maintain their daily routines, including