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Rituximab treatment of post-COVID-19 development of acute-onset chronic inflammatory demyelinating polyneuropathy

Post-COVID-19 vývoj chronické zánětlivé demyelinizační polyneuropatie s akutním začátkem léčené rituximabem

Dear editors,

We would like to present a case report of a patient with post-COVID-19 development of acute-onset chronic inflammatory demyelinating polyneuropathy (CIDP). According to the latest 2021 revision of the European guidelines, CIDP is divided into the typical CIDP and CIDP variants. The typical CIDP is characterized by a progressive or relapsing symmetrical proximal and distal muscle weakness of upper and lower limbs with progression for more than 8 weeks, sensory loss, and reduction or absence of tendon reflexes. About 13% of patients may develop an acute-onset CIDP (A-CIDP); in this case, it is difficult to distinguish from Guillain-Barré syndrome (GBS) [1].

A 34-year-old sportsman without comorbidities was urgently transferred to our neurological department from the district hospital for an acute onset of acral neuropathic pain, tingling in all limbs, and progressive weakness of upper and lower limbs. He has undergone an asymptomatic COVID-19 infection confirmed by a positive SARS-CoV-2 PCR test 24 days before symptoms onset. A lumbar puncture showed albuminocytological dissociation (ACD); elevated total protein concentration in CSF 0.7 g/L (reference range 0.2–0.4 g/L), 3 elements/mm^3 (reference range 0–5 elements/mm^3). There were 2 oligoclonal IgG bands in CSF and serum representing a systemic production of antibodies (Ab). The antiborrelia Ab and Ab against the tick-borne encephalitis virus were negative, ganglioside Ab including the anti-GQ1b, anti-GD1a, anti-GD1b, anti-GM1, anti-GM2 and anti-MAG were also negative. The EMG examination performed on the 2nd day after the onset of symptoms showed prolonged distal motor latency (DML) in median nerves by 50%, borderline DML in ulnar nerves, and bilateral significant prolongation of DML with chronodispersion in the lower limbs. Sensory nerve conduction studies demonstrated a general light reduction of sensory nerve conduction velocity. Neurological examination revealed a mild peripheral left facial nerve lesion, peripheral quadriparesis with muscle power (Medical Research Council scale [MRC]) in the upper limbs (proximal 3, distal 2) and lower limbs (proximal 3, distal 2), reduction of tendon reflexes and quadridysesthesias. He was unable to walk. We made a working diagnosis of GBS and started a series of five therapeutic plasma exchanges (TPEs). This was followed by an improvement of muscle power in the upper limbs (MRC proximal 4, distal 3), and in the lower limbs the MRC was proximal 3, and distal 2. He was able to walk with a counter walker and subsequently was transferred to the neurorehabilitation in-hospital unit. After one month, he developed a relapse of the disease with a worsening of the peripheral quadriparesis – he was unable to walk again. Repeated lumbar puncture showed a progression of ACD (elevated total protein concentration in CSF 1.3 g/L; 2 elements/mm^3). Repeated EMG showed a worsening of the following findings: a significant prolongation of DML with low amplitudes, and absent F waves and sensory studies were absent. There was spontaneous pathological activity in needle EMG (fibrillations and positive sharp waves) and reinnervation potentials with an amplitude of 3 mV. A series of 5 TPEs was repeated. The third relapse occurred within the next 5 weeks. He developed further progression of weakness – being unable to walk for more than 3 meters with the support from 2 people. The third relapse and evolution of the symptoms over 8 weeks led to a re-classification of diagnosis to A-CIDP. An off-label immunotherapy with rituximab was initiated (dose 375 mg/m^2 every 4 weeks for 4 times followed by 1,000 mg every 6 months) [2]. Currently, five months after the fifth dose of rituximab, the patient is fully ambulatory and playing recreational sports. His neurological deficit has resolved almost completely (residual tendon hyporeflexia and mild sensory ataxia). The last EMG showed significant improvement in the amplitude and conduc-

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tivity parameters of motor and sensitive neurograms.

So far, we have found two case-reports of CIDP development after COVID-19 vaccination and one case after the combination of COVID-19 infection and vaccination [3–5]. The first case report described a 72-year-old man with pre-existing idiopathic neuropathy. Three weeks after the vaccination with the AstraZeneca COVID-19 vaccine, he developed peripheral quadriparesis, loss of vibratory sensation, and pinprick sensation in both hands and up to mid-thigh. Due to the time course (6 weeks), ACD in CSF and EMG findings (prolonged DML with reduced nerve conduction velocity), the diagnosis was classified as CIDP. After intravenous immunoglobulin (IVIG) treatment, the patient's neurological deficits improved [3]. The second case report was also described after the vaccination with the AstraZeneca COVID-19 vaccine. A 49-year-old man developed an asymmetrical facial diparesis and paresthesia in the tongue and face, and lower limb tendon areflexia 16 days after the vaccination. A diagnosis of GBS was established and he was treated with IVIG with slight clinical improvement. However, after 2 months from the first symptoms, there was a further worsening alongside the worsening of the EMG findings. The diagnosis was re-classified as A-CIDP, IVIG treatment was repeated and then IVIG were administred every 6 weeks [4]. The last case was a 47-year-old man who presented with progressive quadriparesis and facial diparesis. This patient had COVID-19 pneumonia 7 months ago and was vaccinated (AstraZeneca) 17 days ago. His initial diagnosis was also GBS, and he was treated with IVIG. He developed 2 additional relapses, and the diagnosis was reclassified as A-CIDP. After IVIG treatment, he was treated with oral prednisolone and azathioprine [5] – resulting in marked improvement of infranuclear seventh nerve lesion and quadriparesis with resolution of the exteroceptive deficit and with no further relapses.

Unlike the authors of the above-mentioned case reports, we have initially treated our patient with TPEs. The evidence shows comparable efficacy to IVIG and at lower costs [6]. According to the European guidelines, TPEs are a strongly recommended treatment for CIDP. Induction treatment should start with 5 TPEs within 2 weeks of symptoms onset and then the interval should be adjusted individually [1]. However, since repeated TPEs did not lead to any clinical improvement of our patient, we decided to use off-label treatment with rituximab.

In the above-mentioned case reports and also in our case, the association with COVID-19 disease/vaccination cannot be excluded, although in the case of the CIDP, finding of infection before the disease onset is rare and thus it is considered as unlikely [7].

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