CASE REPORT

Post influenza vaccination Guillain-Barré syndrome: An exceptional recovery case after cardiac arrest for two hours in hyperthermia and septic shock

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ABSTRACT

Autonomic dysfunction is a frequent and severe complication of Guillaine-Barré syndrome (GBS). It is often responsible for cardiovascular abnormalities, even cardiac arrest, but prediction of these complications is difficult. We describe the case of a 77-year-old woman admitted to Intensive Care Unit for acute respiratory failure and loss of consciousness of unknown nature. The diagnosis of post-influenza vaccination GBS was delayed due to the difficulty in collecting anamnestic data. The patient was treated with IV immunoglobulin but the clinical picture was complicated by hyperthermia, cardiac arrest and septic shock. After 122 min of CPR, blood pressure was restored to 98/40 mmHg and sinus tachycardia at 130 beats/min with negative T-wave in precordial leads. Neurologically the patient showed CGS 3. The persistent hemodynamic instability, fever, and high values of inflammatory markers led to the diagnosis of septic shock. Coupled Plasma Filtration Adsorption (CPFA) was immediately carried out with high volume of treated plasma. On 36th day the patient was discharged conscious, able to move spontaneously all limbs and without any sensory or motor deficit. This case is unique due to complete recovery of the patient after cardiopulmonary resuscitation (CPR) for more than two hours in hyperthermia, and it has never been described before. We emphasize that the use of an aggressive rescue therapy like CPFA in a comatose patient undergoing CPR for over 2 hours in hyperthermia can be helpful in elderly patients too. It is prudent to establish rapid diagnosis, and consider neurological signs and symptoms in the context of a recent vaccination.

Key words: Guillain-Barré Syndrome; Shock, Septic; Sepsis; Cardiac arrest; Cardiopulmonary Resuscitation

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Abbreviations: GBS = Guillain-Barré syndrome; AIDP = Acute Inflammatory Demyelinating Polyradiculoneuropathy; AMAN = Acute Motor Axonal Neuropathy; AMSAN = Acute Motor and Sensory Neuropathy; BMI = Body Mass Index; CSF = cerebrospinal fluid; CPR = Cardiopulmonary Resuscitation; PEA = Pulseless Electrical Activity; GCS = Glasgow Coma Scale; CPFA = Coupled Plasma Filtration Adsorption; CVVH = Continuous Veno-venous Hemofiltration

INTRODUCTION

Guillain-Barré syndrome (GBS) is an acute immune-mediated polyradiculopathy that presents with a rapidly progressive course. It is characterized by areflexic, symmetric ascending motor paralysis with or without sensory disturbances. Incidence increases with age (four cases per 100,000 people over 75 years old) and it is seen more often in males. The clinical course of GBS can be complicated by pneumonia, sepsis, pulmonary embolism, respiratory paralysis or cardiac arrest due to involvement of the autonomic nervous system.[1] Based on well-controlled population-based studies the incidence of GBS in Europe is 1.2–1.9 cases per 100,000, while, the worldwide

incidence is 0.6–4 cases per 100,000.[2] Different clinical subtypes producing the spectrum of GBS have been described, such as acute inflammatory demyelinating polyradiculoneuropathy (AIDP), acute motor axonal neuropathy (AMAN), acute motor and sensory neuropathy (AMSAN).[3] Generally, GBS is manifested by progressive and caudal–cranial paralysis of the limbs. It can also lead to respiratory failure, due to the paralysis of the respiratory muscles and to autonomic changes leading to cardiac arrest or even death.[4,5] There is another life-threatening condition seen in ICU-septic shock as a terminal event of severe sepsis. We report this special case for the following reasons: primarily the difficulty of diagnosing this neurological disease due to a misleading appearance of it; and secondly, prolonged resuscitation in a state of hyperthermia and septic shock. All of these associated factors certainly had increased the risk of death in our patient, who managed to survive against all odds and with complete neurological recovery, as evidenced on her follow-up for several months. She enjoyed good health and carried out routine daily tasks in an absolutely normal way.

CASE REPORT

A 77-year-old woman was admitted to Intensive Care Unit for acute respiratory failure and loss of consciousness of unknown etiology, was intubated and connected to the ventilator. Her relatives reported that ten days back, she had had low grade fever, cough and diarrhoea. Anamnestic data showed morbid obesity (BMI: 39.7) and hypertension treated with calcium-antagonist, but no history of previous hospitalisation, any allergy or heart disease. After a few days of hemodynamic instability, the patient recovered consciousness. Her blood pressure returned to normal, gas exchange and spontaneous ventilatory pattern became normal and she was extubated.

However, extubation failed due to unexpected development of inability to maintain autonomous breathing. We noticed weakness of both of her upper limbs and the right lower limb. The patient required reintubation and supported ventilation. Low-grade fever persisted, but culture tests remained negative even on the 7th day.

We took to talking to the family members again, who reported the use of influenza vaccination during the early days of December and the appearance of lower limb weakness. There was also an episode of the patient falling to the ground without loss of consciousness 10 days before hospital admission. On the basis of the collected data, the failed extubation and flaccid paralysis of the limbs, acute infectious polyneuritis was suspected and a lumbar puncture was performed. The laboratory examination of CSF demonstrated no significant increase of proteins (54 mg) and virology was negative. Magnetic Resonance Imaging (MRI) of brain and spinal cord showed no significant changes in morphology or in signal intensity. Neurological consulting and electromyography (EMG) exam were also performed. The EMG showed denervation of the examined right lower limb muscles and marked nerve damage with signs of denervation of the examined right upper limb muscles confirming our provisional diagnosis. The patient was then given immunoglobulin (400 mg/kg/day) IV over five days. She gradually recovered motility of her upper and lower limbs. On day 18, percutaneous tracheostomy was performed. On late hours of day 21, the hemodynamic parameters became unstable and laboratory data showed high WBC count suggesting the development of severe sepsis. It was treated by volume replacement but without any improvement. Invasive hemodynamic monitoring with VIGILEO™ (Edwards Lifesciences®) was placed and norepinephrine infusion was started at a rate of 0.14 μg/kg/min.

In the early hours of the next day, the patient developed agitation, fever (37.8°C), sudden bradycardia (30 beats/min) and a marked hypertension, followed immediately by severe hypotension (67/47 mmHg), cardiorespiratory arrest and coma. CPR was started immediately, during which her electrocardiogram trace showed either asystole or PEA (Pulseless Electrical Activity) alternatively. Epinephrine 1 mg was administered every 3–5 minutes, for a total of 30 mg and closed chest compression was continued at 100-110/min. At the end of the first 60 minutes of CPR, spontaneous breathing appeared, whilst after 122 minutes, carotid and peripheral pulses reappeared. Blood pressure was restored at 98/40 mmHg and ECG showed sinus tachycardia at 130 beats/min with appearance of negative T-wave in precordial leads. Neurologically, the patient showed GCS 3. Pupils were dilated and photomotor reflex was sluggish, but anisocoria (different sized pupils) never appeared. The first arterial blood gas analysis, performed 28 min after CPR, showed severe metabolic acidosis, which was treated with inj. sodium bicarbonate 100 mEq. Blood gas analysis, performed after circulation was restored (05:27 am), still showed a normal pH (7.43), a reduced respiratory acidosis

(PCO_2 52 mmHg vs 65 mmHg), but a high value of lactate (4.7) as well as hyperglycemia. The hemodynamic support with inj. norepinephrine (0.14 -0.10 μg/Kg/min) and inj. epinephrine (0.27 μg/Kg/min) was progressively reduced until it was suspended on 27th day of hospitalization. Forced diuresis with infusion of furosemide was continued for two days. The echocardiography showed apical hypokinesia and left ventricular ejection fraction 50%. Chest-x-ray picked up a consolidation area in the left lung. Deep sedation and controlled mechanical ventilation with FiO_2 (80%) lasted from 22nd to 24th day.

The patient still had continuous fever (37.8°C - 38.3°C) and blood laboratory tests showed the presence of high values of inflammation markers; therefore, a diagnosis of septic shock was made. Broad spectrum antibiotic therapy was implemented and culture tests were repeated. Coupled Plasma Filtration Adsorption (CPFA) therapy was carried out using blood-flow of 100–120 ml/min for 12 hours, followed by Continuous Veno-Venous Hemofiltration (CVVH) for another 12 hours. The blood/plasma ratio was 10%, the weight loss from 100 ml/h to 300 ml/h and the plasma exchange was 11.2 lit.

At the end of treatment, laboratory tests showed a significant improvement in values of inflammation markers and of D-Dimer. During the same day EEG, CT and MRI were performed, and all of the results were found negative for any abnormal focal sign. Antibiotic therapy was targeted according to antibiogram, with gradual improvement of values of the inflammatory markers as well as procalcitonin (0.07 μg/ml); however, the body temperature normalised on 28th day of hospitalization. Blood cultures and bronchial specimens were negative, only few colonies of E. Coli were detected in urine culture. From day 25 to 28, the patient recovered full consciousness and progressively resumed spontaneous breathing. Control chest radiography showed a normal left lung on day 26. The echocardiography, repeated just before the patient's discharge, showed normal findings. Renal indices showed a mild renal failure (creatinine 1.4 mg/L). Tracheostomy tube was removed on day 35. Patient's total stay in ICU was 39 days.

At discharge, the patient was conscious, able to move all limbs spontaneously and sensory-motor deficits were absent. She was not always oriented in space and time but collaborating enough and able to feed itself.

DISCUSSION

Autonomic dysfunction is a frequent and severe complication of GBS. It is often responsible for cardiovascular abnormalities, even cardiac arrest, but a prediction of the complications is difficult to be made.[6] Even in developed countries 5% of patients with GBS die from medical complications. Therefore, all patients, whenever feasible, should be treated in intensive care unit.[7] Treatment with immune globulin is reported to be as effective as plasma exchange, hence medical therapy has replaced the use of plasma exchange at many centers because of greater convenience and easy availability.[7] Early diagnosis is important to rapidly start targeted therapy, recommended within two weeks by the onset of symptoms. In our case, even the diagnosis at admission was misleading and the information about vaccination for flu and fall due to weakness of the lower limbs was known to us very late. Immune globulin administration was started well in time. The relationship of unexpected and prolonged cardiac arrest and the extraordinary full neurological recovery with high body temperature and mortality is still not well-understood.[8] Most likely the combined effect of autonomic dysfunction of GBS and the dramatic appearance of septic shock contributed to the sudden asystole, and probably triggered the cardiac impairment. It's noteworthy that clinical course of GBS can be complicated by sepsis. Septic shock is always life-threatening, so we treated it immediately with CPFA, which was effective in eliminating the pro-inflammatory mediators of septic shock and thus prevented the emergence of MODS. The latter lasted for 10 h and was followed by extra-corporeal blood purification with CVVH (Continuous Veno-Venous Hemo-Filtration) for another 12 hours. CPFA is an extra-corporeal therapy aimed at the non-specific removal of cytokines and mediators involved in systemic inflammation and immune suppression by the use of plasma filtration coupled to an adsorbent resin cartridge. Several cytokines that are removed by CPFA have also been implicated in leukocyte recruitment, amplification of the inflammatory response and blood-brain-barrier permeability.[9] This method presents considerable affinity with the systems of selective and non-selective plasmapheresis, suitably used for the treatment of inflammatory diseases such as GBS. In fact, the classic pathological findings of the latter are clearly inflammatory consisting mainly of T cells, macrophage infiltrates and early complement activation.[7] Plasma exchange is not specific in removing antibodies and complements

but it appears to be associated with nerve damage reduction and faster clinical improvement. It is very likely, therefore, that the good clinical response obtained with the application of the CPFA in this patient, has contributed to positive effects both on the septic shock and on the inflammatory demyelinating polyneuropathy.

CONCLUSION

We would like to emphasize that some inflammatory polyneuropathies may be complicated by the occurrence of severe sepsis and septic shock such as reported in the literature. The reported clinical case, presented an overlapping of complex events that required a rapid decision making. The dilemma was whether or not to carry out an extra-corporeal life-saving technique on an elderly patient who underwent CPR for over two hours in hyperthermia. In light of the obtained results we think that the application of an aggressive rescue therapy like CPFA in a comatose patient undergoing CPR for over 2 hours in hyperthermia has been a right ethical choice. Subsequently we think that some inflammatory polyneuropathies could benefit from plasmapheresis treatment as regards to administration of immune-globulin even if there is no scientific evidence.

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Conflict of interest: Authors declare no conflict of interest

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We have purchased at great cost lessons literally bought with blood that we have to preserve as institutional knowledge and pass on to succeeding generations. We cannot have the moral failure of forgetting those lessons and have to relearn them.

CAPTAIN CHESLEY SULLENBERGER, WHO SAFELY BROUGHT DOWN HIS PLANE IN THE HUDSON RIVER, NEW YORK