Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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A.V., EC and V.H. collected the information, and wrote the case description and the discussion.

N.A and S.H. provided the microbiological expertise and reviewed the article.

O.R. and B.F. provided infectious and liver expertise, and reviewed and corrected the article.

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Measles-associated pneumonia in an immunocompromised patient: Persistent shortcomings in vaccination guidelines

1. Introduction

We report the case of an immunocompromised patient who presented with severe measles-associated pneumonia. Vaccination guidelines seem to be incomplete.

2. Case report

A 33-year-old French man had a medical history of IgA nephropathy with endo- and extra-capillary proliferation and stage 3a chronic kidney failure. He had been treated by cyclophosphamide in 2015 and then by prednisolone until 2016. Since that time, he was considered in remission.

On February 14th, he consulted in the emergency ward with a flu-like syndrome. Since he did not present any severity sign, he was discharged later that day. On February 22nd, a widespread morbilliform rash appeared, concomitantly with cough and dyspnea. He returned to the emergency ward on the same day, presenting with respiratory distress. Bilateral pneumopathy with ground-glass opacity was observed on chest computed tomography. Given his need for supplemental oxygen, on February 24th, he was intubated and mechanically ventilated. He was found to have a mild acute respiratory distress syndrome. He also suffered from myocarditis with septal hypokinesia and decrease of the left ventricular ejection fraction to 40%.

The diagnosis of measles-associated pneumonia was assessed by serology (positive IgM and negative IgG, DiaSorin Liaison XL), and confirmed by serum and saliva qualitative PCR. Both nasopharyngeal and endotracheal SARS-CoV-2 RT-PCR were negative.

The outcome was favourable.

While the patient reported having received 2 MMR vaccine doses (measles, mumps, rubella) in childhood in accordance with French vaccination guidelines, he had not been re-vaccinated after the aforementioned cyclophosphamide and prednisone treatments and no serological test was performed after immunosuppressive therapy.

3. Discussion

There is no international consensus on vaccination against measles in patients experiencing immunodepression.

In fact, HAS guidelines, in France and IDSA guidelines in the USA strongly recommend after hematopoietic stem cell transplantation or after chemotherapy for a solid organ cancer or a hematologic malignancy [1,2].

However, there is no clear recommendation for revaccination of patients treated with an immunosuppressive therapy for an autoimmune or inflammatory disease.

In its guidelines, HAS does not mention these types of immunocompromised patients. The IDSA guidelines contraindicate vaccination while under treatment and mention the innocuity of this vaccination after treatment discontinuation, but they do not clearly recommend revaccination.

As for the Canadian guidelines, while suggesting a vaccination according to the benefit-risk balance, they offer no more further precision [3], nor do theEULAR (European League Against Rheumatism) guidelines provide a formalized indication for revaccination of patients with rheumatismal auto-immune disease treated with immunosuppressive drugs [4].

As regards the studies on serological tests for immunity to measles in patients under immunosuppressive therapy for an autoimmune or inflammatory disease, their conclusions are not unequivocal.

Kamei K. et al. [5] studied children presenting with nephrotic syndrome and treated with immunosuppressive drugs (cyclosporin, tacrolimus, mycophenolate mofetil, mizoribin, or corticosteroids) and demonstrated a seroconversion rate of 96% following a primary vaccination, with persistent seroprotection for 1 year in 83% of patients. They did not report longer follow-up.

Miyamoto M. et al. [6] studied children from 6 to 18 years old, presenting with systemic lupus erythematosus and treated by immunosuppressive drugs (cyclophosphamide, corticosteroids, mycophenolate mofetil, or cyclosporin). These children were up to date on measles vaccination (two vaccine doses after 1st birthday), and it was shown that their antibody levels in those children were similar to those found in a healthy control group.

Borte S. et al. [7] studied children aged from 6 to 17 years, presenting with juvenile idiopathic arthritis and treated by methotrexate with or without etanercept. They had been vaccinated against measles 4 years on average before the outset of immunosuppressive treatment. Antibody levels were significantly lower than those found in the healthy control group. Immunization was achieved after revaccination, which was carried out without stopping the immunosuppressive drug. Assessed at least 6 months after the new vaccination, antibody levels were similar to those found in the healthy control group.

Caldera F. et al. [8] observed adult patients presenting with chronic inflammatory intestinal disease and treated by immunosuppressive drugs (azathioprine, thiopurine, or anti-TNF agents). They had been vaccinated in childhood against measles, and their antibody levels were similar to those of the healthy control group. To the best of our knowledge, this is the only recently published study dealing with post-vaccination measles serology on adult subjects treated with immunosuppressive therapy. The other studies involved children and were without long-term follow-up of post-vaccination measles immunity serology.

Since the generalization of measles vaccination, and following the measles vaccine action plan of the WHO (2001–2005), the number of cases has markedly fallen worldwide. Indeed, from 2000 to 2017 the annual number of deaths decreased from 550,100 to 110,000.

However, vaccine coverage remains insufficient. In 2019, it was estimated that while 85% of the target population had received the first dose, only 67% had been given the second [9]. Implemented from 2010 to 2020 and designed to put an end to virus circulation, the second WHO measles action plan aimed for 95% vaccine coverage.

In France in 2017, vaccine coverage in came to “only” 80.3% for 2 vaccine doses at the age of 2 years [10].

To conclude, it bears mentioning that since 2016, the number of cases has been rising worldwide each year, with 132,490 reported in 2016 and 869,770 in 2019.

In France in 2019, 2636 cases were noted, 28.5% of which necessitated hospitalization.

As regards measles cases, 86% to 88% occurred subsequent to non-vaccination or incorrect vaccination. In fact, France is the European country having in that year notified the highest number of cases to the European Centre for Disease Prevention and Control (ECDC).

4. Conclusion

In order to diminish worldwide incidence of measles, which is currently rising, vaccination coverage needs to be improved. More precisely, the guidelines for revaccination of patients receiving immunosuppressive therapy for an autoimmune or inflammatory disease are incomplete and imprecise.

The case we have reported underscores a need for studies on this specific immunocompromised population, studies leading to the publication of appropriate recommendations.

While awaiting studies and guidelines, it behooves us to verify vaccine-induced measle immunity in patients having been treated by an immunosuppressive therapy.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the 1964 Helsinki declaration and its later amendments.

Disclosure of interest

The authors declare that they have no competing interests.

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