



Anti-SARS-Cov2 vaccination at the time of the COVID-19 pandemic: suspected adverse events reporting is the milestone of post-marketing surveillance

Alice Mariottini^{1,2} · Anna Maria Repice² · Alessandro Barilaro² · Luca Massacesi^{1,2} 

Received: 29 December 2021 / Accepted: 15 February 2022 / Published online: 23 March 2022
© Fondazione Società Italiana di Neurologia 2022

Dear Editor,

The present letter is to report the case of a 27-year-old woman who came to our attention a few months ago with symptoms of multiple sclerosis (MS) onset that occurred after having received the COVID-19 vaccine AstraZeneca.

In February 2021, the patient received vaccination with COVID-19 vaccine AstraZeneca (Vaxzevria). [1] The COVID-19 vaccine AstraZeneca is a replication-deficient chimpanzee adenoviral vector ChAdOx1, containing the SARS-CoV2 structural surface glycoprotein antigen (spike protein; nCoV-19) gene, that had received conditional marketing authorisation by the European Medicines Agency (EMA) for active immunisation to prevent COVID-19 in individuals 18 years of age and older, based on the interim analysis of four pivotal studies where 13,661 individuals were randomised to receive COVID-19 vaccine AstraZeneca or the anti-meningococcal vaccine MenACWY. [2] Ten days after the vaccination, the patient experienced numbness in her left arm, homolateral to the site where she had received the jab. She had a medical consultation, but the symptoms were considered as a local adverse event of the vaccine and no neurological evaluation was suggested at that time. These symptoms resolved spontaneously in about 2 weeks. She had an anti-Spike IgG testing resulting positive, with a titre of 1244 BAU/mL (cut-off > 50). Fourteen weeks later (May 2021), she received the second dose of COVID-19 vaccine AstraZeneca, as scheduled. Three days after the second dose, she awoke feeling numbness in her abdomen, and over the

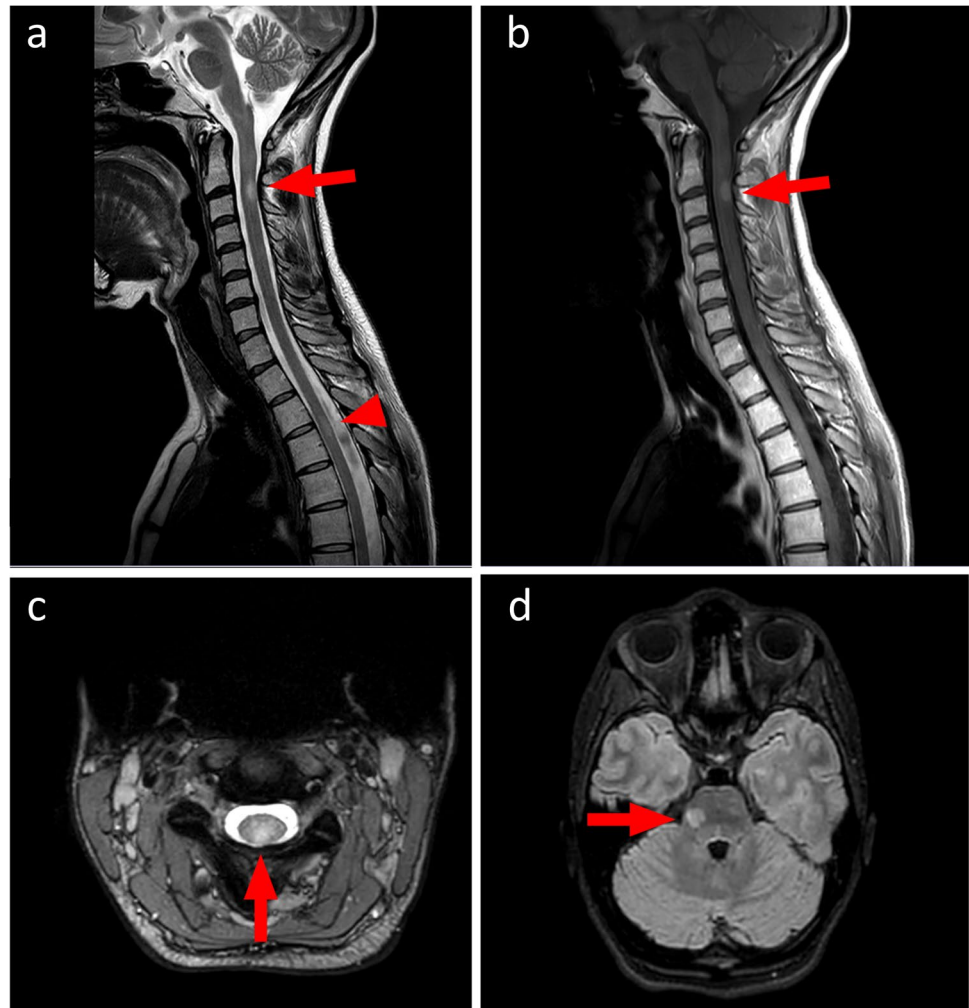
subsequent few days the numbness progressively involved the ulnar side of her upper limbs, and then her lower limbs. She accessed the emergency department, where her general examination was unremarkable, and the vital signs were within normal values. Sensory and motor evoked potentials did not show any abnormalities. She was then discharged, but due to the persistence of the neurological symptoms, a few days later (June 2021), she underwent a brain magnetic resonance imaging (MRI) examination that showed multiple hyperintense T2 lesions in the periventricular and infratentorial white matter, suggestive of a demyelinating disease. A spinal cord MRI revealed one enhancing lesion in the posterior columns of the cervical cord (C3 level), and two further non-enhancing lesions at C2 and T4 levels (Fig. 1). She then came to our attention in the last week of June 2021. Her past medical history was unremarkable. She had a pregnancy with regular delivery 3 years before. Upon specific request, she denied any neurological symptoms had ever occurred before the first abovementioned episode. The neurological examination showed broadened-base gate, mild bilateral dysmetria at the toe-heel test, brisk tendon reflexes, superficial hypoesthesia in the four limbs with thoracic level T4; nystagmus. She received a 5-day course of high-dose IV methylprednisolone with improvement of her symptoms. A spinal tap showed 3 white blood cells in the cerebrospinal fluid, Link index 0.9, and the presence of oligoclonal bands. Anti-MOG and anti-AQP4 antibodies, as well as screening for autoimmune and infective diseases, were negative, and she was diagnosed with MS. At the end of July, she experienced blurred vision in her right eye and weakness in her right limbs; she was therefore treated with another course of IV corticosteroid and screening tests were carried out to commence a highly effective disease-modifying treatment. In the meanwhile, 5 weeks later, she experienced a further worsening of symptoms with numbness in her lower limbs and marked fatigue. She then started on ocrelizumab, without further clinical episodes since then.

✉ Luca Massacesi
luca.massacesi@unifi.it

¹ Department of Neurosciences, Drug and Child Health, University of Florence, Viale Gaetano Pieraccini, 6, 50139 Florence, FI, Italy

² Tuscany Region Multiple Sclerosis Referral Centre, Neurology 2, University Hospital of Careggi, Florence, Italy

Fig. 1 Brain and spinal cord MRI undertaken in June 2021. **a** Sagittal T2-weighted cervical-thoracic spinal cord MRI. Hyperintense T2 lesions in the spinal cord at C3 level (arrow), and T4 level (arrowhead). **b** Sagittal T1-weighted cervical spinal cord MRI following gadolinium administration, showing contrast enhancement of the demyelinating lesion at C3 level. **c** Axial T2-weighted cervical spinal cord MRI showing involvement of the posterior columns at the C3 level. **d** Axial FLAIR brain MRI showing a hyperintense T2 lesion in the right pons



The present case reports an onset of MS following vaccination with anti-COVID19 AstraZeneca vaccine. Similarly to our patient, a few cases of newly diagnosed MS following anti-COVID19 vaccines have been reported. [3–5].

The peculiarity of the present case is that the patient had experienced an episode of neurological symptoms following the first dose, that was diagnosed as a local adverse event but, in our opinion, it cannot be reasonably excluded that this might indeed represent the actual first clinical manifestation of the disease, as MRI examinations were not undertaken at that time and not enhancing demyelinating lesions potentially congruous with the symptoms were observed in the scan performed 4 months later. It cannot be excluded that the vaccine administration uncovered a prior central nervous system inflammation that had occurred without clinical signs, triggering its clinical manifestation through the activation of the immune system. It could be argued whether the administration of the second dose of vaccine could have somehow affected the subsequent MS course, triggering further attacks. This observation strengthens the need for careful monitoring of potential adverse events, given that

the massive administration of anti-SARS-Cov2 vaccines to huge numbers of individuals might uncover potential rare adverse events that could not be detected during the pivotal trials involving relatively small samples. It is therefore of pivotal importance that the highest attention in monitoring and reporting any possible or suspected adverse events is adopted.

In the case that a possible adverse event is linked to treatment, the prompt identification of the related potential risk factors might allow preventing possible serious complications in susceptible individuals. An excellent example of post-marketing surveillance has recently been provided by the prescribing restrictions and cautions that EMA had imposed over the COVID-19 AstraZeneca vaccine for the observation of unexpected adverse events such as the occurrence of thrombosis in combination with thrombocytopenia and capillary leak syndrome, thus reducing the risk of further potential severe complications in susceptible individuals. [6]

Adequate knowledge in this field, coupled with the availability of different vaccines, might allow adopting

tailored-vaccination strategies that could maximise the benefits for all the individuals treated.

Declarations

Conflict of interest The authors declare no competing interests.

Ethical approval None.

Informed consent Written informed consent for publication of her clinical details was obtained from the patient. A copy of the consent form is available for review by the Editor of this journal.

References

1. Agency EM (2021) Vaxzevria (previously COVID-19 vaccine AstraZeneca). Available from: <https://www.ema.europa.eu/en/medicines/human/EPAR/vaxzevria-previously-covid-19-vaccine-astrazeneca>. Accessed 30 Sept 2021
2. Voysey M, Clemens SAC, Madhi SA et al (2021) Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. *Lancet* 397(10269):99–111. [https://doi.org/10.1016/S0140-6736\(20\)32661-1](https://doi.org/10.1016/S0140-6736(20)32661-1) [published Online First:2020/12/12]
3. Havla J, Schultz Y, Zimmermann H et al (2022) First manifestation of multiple sclerosis after immunization with the Pfizer-BioNTech COVID-19 vaccine. *J Neurol* 269(1):55–58
4. Nistri R, Barbuti E, Rinaldi V et al (2021) Case report: multiple sclerosis relapses after vaccination against SARS-CoV2: a series of clinical cases. *Front Neurol* 12:765954
5. Khayat-Khoei M, Bhattacharyya S, Katz J et al (2021) COVID-19 mRNA vaccination leading to CNS inflammation: a case series. *J Neurol*:1–14. <https://doi.org/10.1007/s00415-021-10780-7>
6. Agency EM (2021) COVID-19 vaccine safety update. Available from: https://www.ema.europa.eu/en/documents/covid-19-vaccine-safety-update/covid-19-vaccine-safety-update-vaxzevria-previously-covid-19-vaccine-astrazeneca-8-september-2021_en.pdf. Accessed 30 Sept 2021

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.