

Survey of some side effects of COVID-19 vaccination

Abstract

COVID-19 infection is a worldwide issue, and many efforts have been made to eradicate it. Fortunately, the progress of the treatment of COVID-19 after vaccination has been seen. Also, some side effects occurred after second vaccination occurred. In this paper we try to explain some side effects of vaccination of COVID-19.

Keywords: COVID-19, vaccination, adverse effect, myocarditis

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Introduction

COVID-19 infection is a pandemic infection that affects the most countries of the world. Many strategies for prevention and treatment have been developed. Some efforts for the discovery of vaccination and eradication of the COVID-19 have been made. Myocarditis and pericarditis have been seen after vaccination. In some younger patients, myocarditis was observed and in older patients, pericarditis has been observed.^{1,2}

Some vaccines cause myocarditis.³ Also among the adverse effects of some mRNA vaccines myocarditis,^{4,5} has been seen in younger male patients after the second vaccination it was observed in 5 cases per 1 million.⁶ On the other hand, pericarditis may be more common than myocarditis among older patients. Myocarditis was seen within 4 days after vaccination and occurred after the second dose of the mRNA COVID-19 vaccine,¹ the electrocardiogram has shown sinus tachycardia with a narrow QRS complex and diffuse ST-segment elevation; troponin T levels (hsTnT) was increased (139 ng/L).⁶

On the other hand, although anti-inflammatory treatment has been administered during COVID-19 infection^{3,6} but it is possible the relationship between SARS-CoV-2 infection and the onset of autoimmune diseases. Also, in patients with asthma, autoimmune hypothyroidism, and chronic atrophic gastritis, it was supposed that the vaccine induces an autoimmune reaction that leads to acute myocarditis.^{4,6-9} Vaccine-induced myocarditis has been observed following the smallpox vaccination.^{10,11} Also, myocarditis after influenza vaccine in few cases has been observed¹¹ it was reported that by cardiac magnetic resonance (CMR) imaging 4 patients consistent with acute myocarditis have been found whom all of them had been vaccinated. They complained of severe chest pain, biomarkers of myocardial injury increased biomarkers of myocardial injury were increased and they were hospitalized⁷ It was suggested a possible relation between mRNA vaccines and myocarditis after the second vaccination, at an incidence of about 4.8 cases per 1 million.¹² Therefore, an innate immune response to vaccines, occurs after RNA-based COVID-19 vaccines.

Cancers

Tumor progression may occur after immune-inflammatory response as progression of metastatic salivary gland myoepithelial

carcinoma following vaccination with mRNA-1273 COVID-19 vaccine has been reported.¹³ Histological and lung biopsy studies have shown a massive inflammatory infiltrate with scant embedded tumor clusters (<5%). Also, it was shown that the post vaccination lung metastasis samples have had remarkable immune cell infiltrations including CD4+ T cells, CD8+ T-cells, natural killer cells, B cells, and dendritic cells.¹³ Reactogenicity represents the inflammatory response to vaccination as pain, redness, swelling, fever, myalgia, or headache.

In the lung metastases, the post-vaccination samples have shown higher T cells, B cells, and dendritic cells as well as a higher ratio of CD8+T.¹³ On the other hand, the pre-vaccination samples have higher M2 macrophages and neutrophils.¹³ Also, the percentage of T cells expressing the inhibitory receptor T-cell immunoglobulin after vaccination suggests an anti-cancer immune response after vaccination¹³

A severe hyper-inflammatory response occurs in some patients who have the potential to evoke intense immunologic responses. Tumor molecular study indicated that the primary tumor was poorly immunogenic and has poor responses to cancer immunotherapy also in some patients as systemic adverse effects occurred after the second dose of the COVID-19 vaccine as spontaneous tumor progression, indicating that an intense inflammatory host response stimulated by the vaccine, including increases in CD8+ and CD4+ T-cell tumor infiltration and granzyme B+ cytolytic cells, are associated with immune cell activation. Also, it was found that there was a reduction in the number of tumor cells and the fraction of remaining cells actively proliferating, indicating an effective anti-cancer response; in fact, enhancing their activity is the main strategy of current successful cancer immunotherapies and an increase in antigen-presenting cell tumor infiltration in post vaccination samples is consistent with the robust innate and adaptive anticancer responses.¹³

Conclusion

The second COVID-19 vaccination has some side effects, and some of them are critical. The relationship between cancer and vaccination is controversial, and more studies are needed before a decision can be made about vaccination for cancer patients.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

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References

1. Su JR, Neil MM, Welsh KJ, et al. Myopericarditis after vaccination, vaccine adverse event reporting system (VAERS), 1990-2018. *Vaccine*. 2021;39(5):839–845.
2. Mele D, Flamigni F, Rapezzi C, et al. Myocarditis in COVID-19 patients: current problems. *Intern Emerg Med*. 2021;16(5):1123–1129.
3. Polack FP, Thomas SJ, Kitchin N, et al. Safety and efficacy of the BNT162b2 mRNA COVID-19 vaccine. *N Engl J Med*. 2020;383(27):2603–2615.
4. Salamanca J, Díez Villanueva P, Martínez P, et al. COVID-19 “fulminant myocarditis” successfully treated with temporary mechanical circulatory support. *JACC Cardiovasc Imaging*. 2020;13(11):2457–2459.
5. Talotta R. Do COVID-19 RNA-based vaccines put at risk of immune-mediated diseases? In reply to “Potential antigenic cross-reactivity between SARS-CoV-2 and human tissue with a possible link to an increase in autoimmune diseases”. *Clin Immunol*. 2021;224:108665.
6. Montgomery J, Ryan M, Engler R, et al. Myocarditis following immunization with mRNA COVID-19 vaccines in members of the US military. *JAMA Cardiol*. 2021;6(10):1202–1206.
7. Kim HW, Jenista ER, Wendell DC, et al. Patients with acute myocarditis following mRNA COVID-19 vaccination. *JAMA Cardiol*. 2021;6(10):1196–1201.
8. Bautista García J, Peña Ortega P, Bonilla Fernández JA, et al. Acute myocarditis after administration of the BNT162b2 vaccine against COVID-19. *Rev Esp Cardiol (Engl Ed)*. 2021;74(9):812–814.
9. Rosner CM, Genovese L, Tehrani BN, et al. Myocarditis temporally associated with COVID-19 vaccination. *Circulation*. 2021; 144(6):502–505.
10. Wallace M, Oliver S. COVID-19 mRNA vaccines in adolescents and young adults: benefit-risk discussion. WHO. Geneva, Switzerland: World Health Organization; 2021.
11. Eckart RE, Love SS, Atwood JE, et al. Department of defense smallpox vaccination clinical evaluation team. Incidence and follow-up of inflammatory cardiac complications after smallpox vaccination. *J Am Coll Cardiol*. 2004;44(1):201–205.
12. George A Diaz, Guilford T Parsons, Sara K Gering, et al. Myocarditis and pericarditis after vaccination for COVID-19. *JAMA*. 2021;326(12):1210–1212.
13. Luana Guimaraes S, Daniel J McGrail, Kaiyi Li, et al. Spontaneous tumor regression following COVID-19 vaccination. *J Immunother Cancer*. 2022;10(3):e004371.