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Relationship between COVID-19 Vaccine and Myocarditis

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Abstract

Several adverse events of COVID-19 vaccines have been reported, which includes myocarditis. COVID-19 vaccines include mRNA vaccines and genetically-modified protein vaccines, and plasmid vaccines. The myocarditis after the COVID-19 mRNA vaccination in males has been reported, which turned out to be mild symptoms in most cases. The relationship between COVID-19 mRNA vaccines and myocarditis is described in this Editorial.

Keywords

Covid-19; Myocarditis; mRNA vaccines; Proinflammatory cascades

Relationship between COVID-19 vaccines and myocarditis

COVID-19 vaccines include messenger RNA (mRNA) vaccines, where myocarditis in male teenagers emerged as a possible rare adverse event [1]. Myocarditis is usually defined as an inflammatory disorder of the heart muscle, while the diagnosis of myocarditis is challenging [1]. A retrospective case series has reported that the increased incidence rate ratio of COVID-19-related myocarditis was observed among adult males compared with females [2]. The majority of the cases occurred within 3 days following the second dose of the vaccine, which showed mild symptoms and all patients survived [2]. Several events of myocarditis have occurred after the second dose of mRNA vaccine for COVID-19 in adolescent males, where the mechanism is still unknown [3]. A study on the myocarditis and COVID-19 vaccine demonstrated that myocarditis related to COVID-19 vaccines mostly occurs in young male individuals with mRNA vaccines, while clinical symptoms resolved within 6 days with preservation of the cardiac function in all reported cases [4]. A survey of clinical records of 2000287 vaccine recipients revealed that myocarditis occurred a median of 3.5 days after vaccination and no death was observed [5].

A case report of a 24-year-old male patient who was diagnosed with myocarditis after receiving the COVID-19 mRNA vaccine demonstrated that the patient recovered after 4 days of hospitalization [6]. A report on six cases of myocarditis after COVID-19 mRNA vaccination showed that five patients presented the myocarditis after the second dose of the vaccine and all patients were males with a median age of 23 years [7]. The clinical course was mild in all six cases reported [7]. Careful vigilance is needed for COVID-19 mRNA vaccines since the rare risk for myocarditis involves in young male adults [8]. Reporting system such as Vaccine Adverse Event Reporting System (<https://vaers.hhs.gov/faq.html>) has been utilized for the assessment of the COVID-19 vaccination [9]. It has been concluded that the benefits of COVID-19 vaccination to individual persons and at the population level clearly outweighed the risks of myocarditis after vaccination [9]. The immune response to mRNA may result in the activation of proinflammatory cascades and immunologic pathways leading to the development of myocarditis [10]. A benefit-risk assessment for COVID-19 vaccination suggested a favorable balance for all age and sex groups, which recommends the vaccination for those over 12 years of age [10]. In conclusion, myocarditis occurred after the COVID-19 mRNA vaccination in young male adults. The mechanism of the myocarditis in regard to the immune reaction may be worth investigating in the future.

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