Myocarditis and pericarditis temporally related to COVID-19 vaccination/ Vaccine associated myocarditis and pericarditis (VAMP)

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Condition for which Ig use is in exceptional circumstances only

Specific Conditions	• Vaccine associated myocarditis • Vaccine associated pericarditis • Vaccine associated myopericarditis
Indication for Ig Use	• Treatment of vaccine associated myocarditis and pericarditis (VAMP)
Level of Evidence	Evidence of probable benefit – more research needed (Category 2a)

Description and Diagnostic Criteria	Myocarditis and/or pericarditis have been reported as rare side effects after mRNA COVID-19 vaccines (Comirnaty and Spikevax), particularly in young adults, in several countries including the USA, Israel, UK, Canada and Italy. Cases have also been reported in adolescents. Vaxzevria has not been associated with an increased risk of myocarditis/pericarditis. Cases have been reported after Vaxzevria, however, cases have not been reported more frequently than the background rate (ATAGI et al., 2021).
	
	Symptoms of myocarditis include chest pain, pressure or discomfort, palpitations, shortness of breath and nonspecific symptoms (for example fatigue). Tachycardia may be a sign of myocarditis or patient may have a 'normal' examination. In cases of severe myocarditis, there may be signs of cardiac dysfunction such as third heart sound or oedema (ATAGI et al., 2021).
	
	Symptoms of pericarditis include chest pain which may be sharp, worse when lying down and alleviated when sitting up and leaning forward and pain on deep inspiration. Signs of pericarditis include pericardial rub on auscultation (ATAGI et al., 2021).
	
	Initial investigations recommended for the evaluation of myocarditis are as follows (ATAGI et al., 2021):
	
	• 12-lead ECG
	  ◦ ST or T-wave abnormalities[#], Q waves
	  ◦ Premature atrial complexes
	  ◦ Premature ventricular complexes
	  ◦ Can be normal
	• Troponin
	  ◦ Commonly raised, however absence of elevation[*] does not exclude myocarditis
	• Inflammatory markers: CRP, ESR
	  ◦ Commonly raised (although non-specific)
	• Chest X-ray (PA)
	  ◦ Heart size can be normal or enlarged (in children this is defined as cardiothoracic ratio >0.5)
	
	[#] N.B. T wave inversion in anterior leads can be normal in people aged ≤ 16 years
	* If ongoing clinical concern, could consider repeating troponin in 12 hours
	
	Initial investigations recommended for the evaluation of pericarditis are as follows (ATAGI et al., 2021):

	• 12-lead ECG
	  ◦ Widespread ST elevation (typically concave up)
	  ◦ PR depression
	  ◦ Small QRS (reflecting pericardial effusion)
	  ◦ Can be normal or atypical
	• Troponin
	  ◦ May be increased (suggestive of myopericarditis)
	• Inflammatory markers: CRP, ESR
	  ◦ Commonly raised (although nonspecific)
	• Chest X-ray (PA)
	  ◦ Typically normal
	  ◦ Rarely, large pericardial effusion can lead to cardiomegaly
	
	The mechanism of development of myocarditis in susceptible individuals is not yet known and a number of potential mechanisms have been described. The immune system may detect the mRNA in the vaccine as an antigen, resulting in activation of proinflammatory cascades and immunologic pathways that may play a role in the development of myocarditis as part of a systemic reaction. There is potential for molecular mimicry between the spike protein of SARS-CoV-2 and self-antigens, including a-myosin. Generation of heart-reactive autoantibodies may have functional effects on cardiac monocytes (Bozkurt B et al., 2021).
	
	Ig treatment may be beneficial patients with left ventricular dysfunction, heart failure, new-onset arrhythmia or hemodynamic instability along with other cardiac or circulatory supportive measures/ treatments (Bozkurt B et al., 2021).

Justification for Evidence Category	This is a newly described condition, with evidence pending.
Diagnosis Requirements	A diagnosis must be made by an Immunologist, Rheumatologist, Paediatrician, Intensivist, Emergency Medicine Physician, Paediatric Infectious Diseases Physician or a Cardiologist.
Qualifying Criteria for Ig Therapy	• Confirmation of vaccination AND • Clinical diagnosis of myocarditis, pericarditis or myopericarditis
Review Criteria for Assessing the Effectiveness of Ig Use	Review is not mandated for this indication however the information provided will support future analysis of the condition and effectiveness of treatment. • Clinical response to Ig therapy
Dose	• **Induction Dose (IVIg)** - 1 - 2 g/kg, as a single dose or divided dose The aim should be to use the lowest dose possible that achieves the appropriate clinical outcome for each patient. Refer to the current product information sheet for further information on dose, administration and contraindications.

Bibliography

Bibliography

Australian Government, Department of Health, Australian Technical Advisory Group on Immunisation et al., *Guidance on Myocarditis and Pericarditis after mRNA COVID-19 Vaccinations*, viewed 16 December 2021, https://www.health.gov.au/resources/publications/covid-19-vaccination-guidance-on-myocarditis-and-pericarditis-after-mrna-covid-19-vaccines

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Dongngan T. Truong *et al*. Clinically Suspected Myocarditis Temporally Related to COVID-19 Vaccination in Adolescents and Young Adults: Suspected Myocarditis After COVID-19 Vaccination. Circulation. 2022;145:345–356. DOI: 10.1161/CIRCULATIONAHA.121.056583

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