CARDIOVASCULAR SIDE EFFECTS

Prior to Rituximab therapy:

→ **Pretreatment echocardiogram** may be helpful when considering rituximab treatment in patients who have a family history of cardiomyopathy.

→ All patients should undergo prior cardiac clinical evaluation with the assessment of cardiovascular risk factors and undergo baseline Echocardiogram (ECG), two dimensional (2D) echocardiography (ECHO), and treadmill test.

***Ideally, all rituximab infusions need to be given with cardiac monitoring in intensive cardiac care unit setup, so that any untoward cardiac arrhythmias can be tackled timely and treated promptly.[1]

During Rituximab infusion:

→ **Discontinue infusions** for serious or life-threatening cardiac arrhythmias. Perform cardiac monitoring during and after all infusions of Rituximab for patients who develop clinically significant arrhythmias, or who have a history of arrhythmia or angina.[2]

→ Monitoring for chest pain, breathlessness, palpitations, giddiness, or syncope during the infusion should be done and treated promptly so that any untoward complication can be avoided.

→ Any chest pain while on infusion of rituximab warrants ECG and consultation with cardiac physician.

***Ideally, all rituximab infusions need to be given with cardiac monitoring in intensive cardiac care unit setup, so that any untoward cardiac arrhythmias can be tackled timely and treated promptly.[3]

Treatment of specific cardiovascular events due to rituximab[4]

Hypotension	• **1 hourly BP monitoring is required or use of noninvasive BP monitoring** as hypotension may occur. • It should be treated with the **judicious use of intravenous (IV) fluids**. • IV fluid should be given as per the ejection fraction of the patient. • If patient is having severe LV dysfunction**, IV fluid should not exceed the rate of 30 ml/hour**
Cardiogenic shock	**IV fluids, inotropic agents** (injection dopamine 5–15 µg/kg/min IV, injection dobutamin 0.5–1 µg/kg/min IV continuous infusion initially, then 2–20 µg/kg/min; not to exceed 40 µg/kg/min), **and vasopressors** (norepinephrine initial dose: 8–12 µg/min continuous IV infusion maintenance dose: 2–4 µg/min continuous IV infusion duration of therapy: Continue infusion until adequate BP and tissue perfusion are maintained without therapy.
ACS (unstable angina, ST-elevation MI, and non-ST-elevation MI)	• ECG, 2D ECHO and cardiac enzymes should be done. • If the patient had ACS, he should be treated with **nitrates, antiplatelets, statins, antithrombotic agent, B-blockers** (sublingual or IV nitroglycerin, soluble aspirin 162–325 mg, and clopidogrel with a 300–600 mg, atorvastatin 40–80 mg, and metaprolol succinate 25–100 mg). • Loading dose is given as initial treatment
Arrhythmia	• As; monomorphic ventricular tachycardia, polymorphic ventricular tachycardia, supraventricular tachycardia, trigeminy, bradycardia, atrial fibrillation, and nonspecific dysrhythmias or tachycardia. • **Calcium-channel blocker or antiarrhythmic** drugs need to be given. • Most of supraventricular arrhythmias are benign and are self-limiting. • if VT occurred it should be treated with DC cardioversion
Reduction in LVEF	May occur within the first few hours after the initial infusion dose or after subsequent doses) diuretics (injection lasix 40–100 mg/day)
Non-ischemic cardiomyopath	2D ECHO is diagnostic modality, it shows reduced LV function and can be managed with B-blockers, diuretics, and ACE inhibitors
Takotsubo's cardiomyopath	**(stress-induced cardiomyopathy)** 2D ECHO is a diagnostic modality, it shows reduced LV function, will be managed with B blockers, diuretics, and ACE inhibitors.

(1) Cheungpasitporn, Wisit, Stephen L. Kopecky, Ulrich Specks, Kharmen Bharucha, and Fernando C. Fervenza. 2017. "Non-Ischemic Cardiomyopathy after Rituximab Treatment for Membranous Nephropathy." Journal of Renal Injury Prevention 6 (1): 18–25.

(2) HIGHLIGHTS OF PRESCRIBING INFORMATION. [cited 2021 Nov 21]; Available from: www.fda.gov/medwatch.

(3) Verma, Sunil Kr. 2016. "Updated Cardiac Concerns with Rituximab Use: A Growing Challenge." Indian Heart Journal 68 Suppl 2 (September): S246–48.

(4) Patil, Vaibhav Bansidhar, Snehal Balvant Lunge, and Bhavana Ravindra Doshi. 2020. "Cardiac Side Effect of Rituximab." Indian Journal of Drugs in Dermatology 6 (1): 49.