

# RAJIV GANDHI INSTITUTE OF MEDICAL SCIENCES :: ONGOLE PRAKASAM DISTRICT

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The C.M.E. Programme is conducted in RIMS., Ongole on 11.08.2013 between 9.00 A.M. to 4.00 P.M.

**Speaker:** Dr.B. Anjaiah,  
Director of RIMS., Ongole.

**Chairman:** Dr.Y. Mallikarjuna,  
Professor of General Medicine.

**Co-Chairman:** Dr.David Williams,  
Assistant Professor of Paediatrics.

**Topic:** MYOCARDITIS IN CHILDREN

**Introduction:** Myocarditis is acute insult to the myocardium of the heart of multiple aetiology. The injured myocardium is enlarged with chamber dilatation. It is also associated with systolic failure, low ejection fraction, decreased intensity of the heart sounds and features of heart failure. Early diagnosis and treatment is very important to salvage the injured myocardium.

**Definition:** Myocarditis is an inflammatory disease of the myocardium with necrosis and / or degeneration of adjacent myocytes not associated with valvular abnormalities.

**Aetiology:**

Common causes of Myocarditis.

	Infection	Immune-mediated
Viral:	Adeno Virus Coxsackie Virus Hepatitis Virus HIV	Auto antigens: Churg-Strauss Syndrome. Inflammatory Bow disease Gaunt Cell myocarditis
Bacterial:	Mycobacteria Streptococcus Spen Mycoplasma pneumonia Treponema Pallidus	Diabetes mellitus Sarcoidosis Systemic Lupus Erythematosus
Fungal:	Aspergillus Candida Coccidioides Cryptococcus Histoplasma	Thyrotoxicosis Takayasu's arteritis Wegener's granulomatous Rheumatic fever <u>Hyper sensitivity</u>
Protozoal:	Try parasoma Cruzi	Sulphonamides

		Cephalosporins
Parasitic:	Schistosomiasis Larva migrans	Diuretics Tricyclic antidepressant Dobutamine <u>Toxic:</u> Anthracycline Cocaine Interleukin-2 Ethanol Heavy metals

World Health Organization (Mantoux Criteria, 1996) A minimum of 14 infiltrating leukocytes per mm<sup>2</sup>, preferably T lymphocytes, and up to 4 macrophages may be included.

Clinical Features:

Chronic presentation depends on the age of the child.

Non specific flu-like illness or episodes of gastroenteritis may precede the symptoms of congestive heart failure.

Newborns and Infants:

Newborns or infants present with poor appetites, vomiting, fever, irritability or restlessness, pallor, and diaphoresis.

Sudden death can occur in children.

OE: Pallor,

Signs of congestive heart failure, such as hepatomegaly, tachypnea, tachycardia and occasionally a gallop.

Children and Adolescents:

There is a history of viral disease 10 to 14 days prior to presentation.

Symptoms:

Lethargy, low-grade fever, and pallor; decreased appetite, vomiting abdominal pain, diaphoresis, palpitation rashes, exercise intolerance, general malaise syncope and sudden death can occur.

OE: Features of congestive heart failure.

Jugular venous congestion, resting tachycardiac ventricular tachycardia and atrioventricular block, muffled first heart sound, 3<sup>rd</sup> heart sound and a murmur of mitral regurgitation. A pericardial friction rub may be present.

#### Maternal History:

Viral myocarditis is most often self-limited and without sequelae, severe involvement may occur.

Acute viral myocarditis, especially when accompanied by severe LV dysfunction (LVEF <35%) may progress to a chronic form and to DCM.

#### Diagnosis:

The diagnosis of myocarditis is often difficult to establish but should be suspected whenever the child is having unexplained congestive heart failure or ventricular tachycardia.

#### X-Ray Chest:

- Cardiomegaly with pulmonary oedema.
- There is evidence of RV enlargement, with loss of the retrosternal space on a lateral view.
- There may be biventricular enlargement.
- In chronic myocarditis, there is enlargement of LV.
- The heart may be normal.

#### ECG:

- Sinus tachycardia with or low voltage QRS complex.
- Inverted T-waves may be present.
- Changes in ST segments may be seen.
- Q-waves may be seen, and are wide and \_\_\_\_
- Pericarditis is associated with ST segment elevation.
- Ventricular arrhythmia including ventricular tachycardia and fibrillation.
- Supra ventricular tachycardia and atrial fibrillation.
- AV block may be seen

#### Echo Cardiography:

- Assessment of chamber size, ventricular thickness and systolic function.
- Pericardial effusion may be seen. \_\_\_\_
- A dilated and systolic dysfunction can be seen.
- Segmental wall motion abnormalities are relatively common.
- Global hypokinesia is predominant.
- Doppler and colour doppler demonstrate mitral regurgitation.

### Serologic Testing:

- Serologic markers are used to identify ongoing myocardial damage.
- Creatine kinase (CK), creatine kinase myocardial band (CKMB), and troponin may be elevated in acute myocarditis. Troponin elevation levels may assist in the identification of paediatric patients with myocarditis.
- The utility of B-type natriuretic peptide (BNP) in children.
- Magnetic Resonance Imaging and Endomyocardial Biopsy are useful for diagnosis of myocarditis.

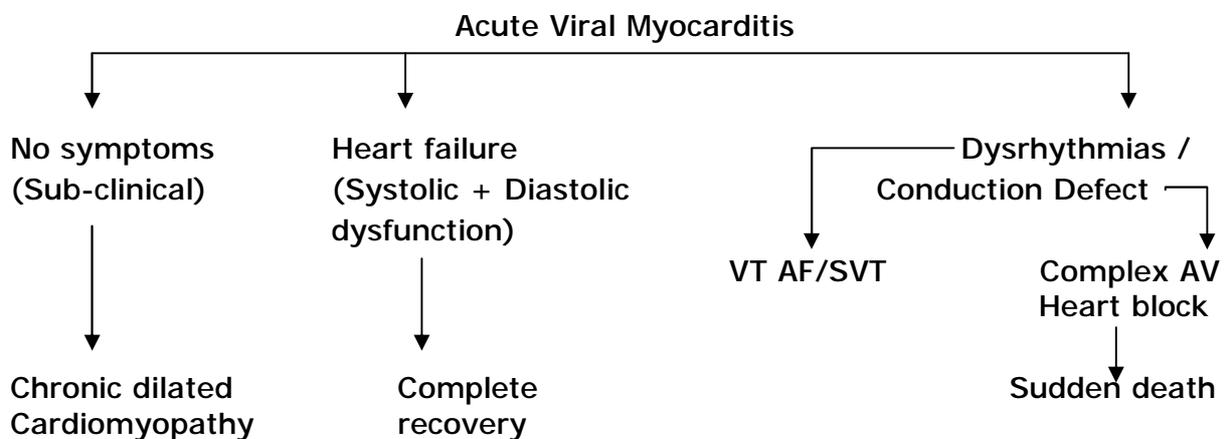
### Treatment:

The treatment of myocarditis consists of supportive care.

Diuretics, angio tension converting enzyme (ACE) inhibitors, beta blockers, and \_\_\_ should be given properly.

Digoxin should be used cautiously because it increases cytokines and only in low doses.

### Clinical presentation of myocarditis



- AF : Atrial Fibrillation
- AV : Atrio-ventricular
- SVT : Supra Ventricular Tachycardia
- VT : Ventricular tachycardia

Suggested reading:

1. Moss and Adams Heart Disease  
In Infants, Children, and Adolescents including the Fetus and Young Adult,  
8<sup>th</sup> Ed., : 1247-1266.
2. Pediatric Cardiology by Robert H Anderson 3<sup>rd</sup> Ed., 2010: 1016-1019.
3. Hurst's The Heart Manual of Cardiology, 2005: 468-470.
4. Manual of Cardiovascular Medicine by Brian P Griffin 3<sup>rd</sup> Ed., 2009: 151-  
160.