

# Pericardial Disease



## 1 Background

Pericardial disease can occur in isolation or accompany myocardial/systemic disease, and may cause constrictive physiology. Visualization may be limited on echocardiography. Establishing a diagnosis, evaluating acuity and extent of disease are important for proper management.

## 2 Why CMR?

- High diagnostic accuracy with direct visualization of pericardial thickness, tethering to myocardium, and epimyocardial fibrosis.
- Excellent image quality independent from body habitus.
- One-stop shop: morphology, function, tissue characterization, and dynamic physiological information.
- No ionizing radiation exposure.

## 3 Guidelines and Appropriate Use Criteria

### Acute Chest Pain

Clinically suspected myopericarditis Class 1\*†  
Myocardial injury with nonobstructive coronary arteries on anatomic testing to evaluate for myopericarditis. Class 1\*

### Pericardial Effusion

Patients with loculated pericardial effusion, pericardial thickening, and/or masses, as well as associated chest abnormalities. Class 2a ‡

### Pericarditis / Constrictive Pericarditis

Second-level imaging technique for diagnostic work-up to assess pericardial thickness, degree and extension of pericardial involvement. Class 1 †‡

### Congenital Anomalies of the Pericardium

Class 1 †

### Cardiac Mass

Suspected mass; Differentiation between benign, malignant, and non-tumorous mass; Guide surgery if deemed appropriate; Evaluate tumor resection/debulking, and monitoring treatment; Evaluate extension of tumors originating from surrounding structures. Class 1 †

\* 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain. J Am Coll Cardiol. 2021;78:e187-e285.



† Leiner T, et al. SCMR Position Paper (2020) on clinical indications for CMR. J Cardiovasc Magn Reson. 2020;22:76.



‡ 2015 ESC Guidelines for the diagnosis and management of pericardial disease. Eur Heart J. 2015;36:2921-2964.



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## 4 Images

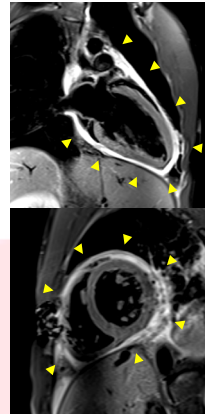
### Acute Pericarditis

Case provided courtesy of: Robert Donnino  
NYU Grossman School of Medicine, NY, USA

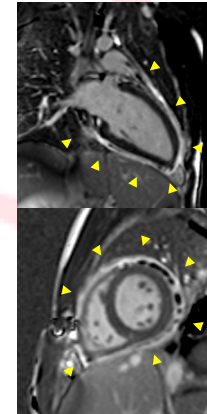
23M with history of subaortic membrane resection, presented with flu-like symptoms. An echocardiogram was performed due to initial concern for infective endocarditis which revealed thickened pericardium and pericardial effusion.

CMR showed that pericardium was circumferentially thickened and enhanced with LGE and high-intensity on T2w, compatible with pericarditis with active inflammation, accompanying small partially organized pericardial effusion. Real-time cine imaging showed septal flattening during inspiration, consistent with interventricular dependency (constrictive physiology).

T2-weighted Dark-Blood (T2w)



Late Gadolinium Enhancement (LGE)



Real-Time Cine Expiration



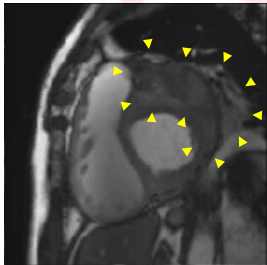
Inspiration



### Metastasized Renal Cell Carcinoma Invading Myocardium through the Pericardium

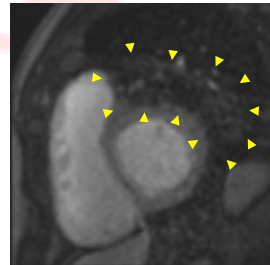
Case provided courtesy of: Kana Fujikura, Andrew Arai  
National Heart, Lung, and Blood Institute, NIH, MD, USA

SSFP Cine



Heterogenous mass abutting the anterior and anterolateral LV wall from base to apex with irregular border.

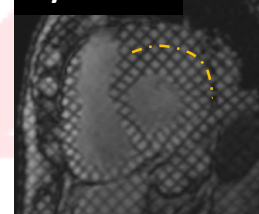
First-Pass Perfusion



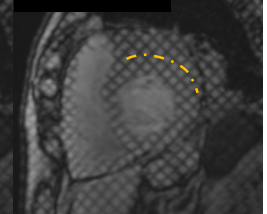
Heterogenous perfusion of contrast in the mass, compatible with tumor with probable central necrosis.

Tagging

Systole



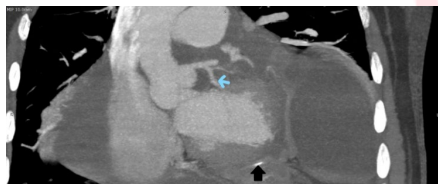
Diastole



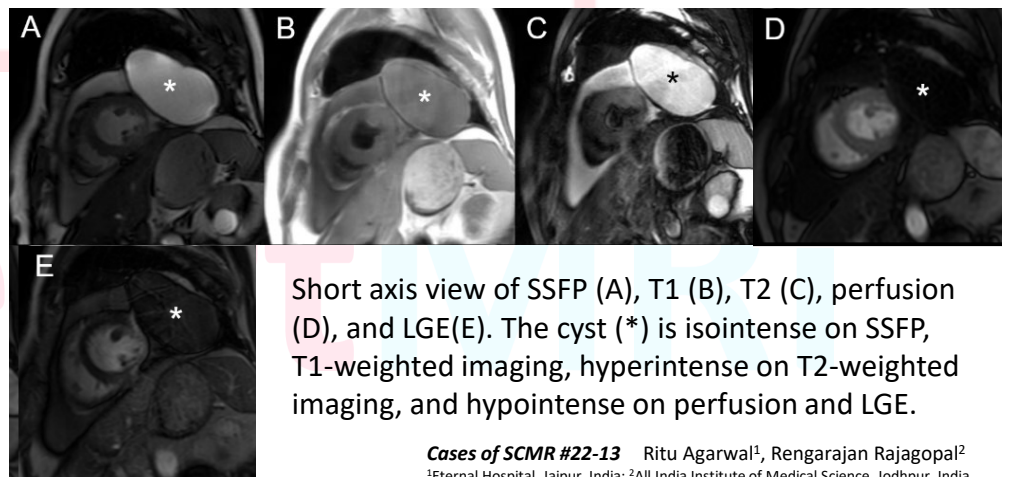
Tagged cine MRI shows the mass is firmly tethered to the myocardium, consistent with tumor invasion to the myocardium through the pericardium.

### Pericardial Hydatid Cyst

54M presented with progressive shortness of breath over the last 4 months. He did not complain of chest pain or palpitations. Echocardiogram showed pericardial effusion and possible cystic lesion in the pericardium.



Coronary CTA showed a multi-lobulated cystic lesion encasing the LCx coronary artery (blue arrow) with subsequent narrowing, and mild pericardial calcification (black arrow).



Short axis view of SSFP (A), T1 (B), T2 (C), perfusion (D), and LGE(E). The cyst (\*) is isointense on SSFP, T1-weighted imaging, hyperintense on T2-weighted imaging, and hypointense on perfusion and LGE.