CMR in the Evaluation and Management of Patients with: Pericardial Disease

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September 30, 2018

Disclosures

• Peer reviewed funding
  – CIHR, Alberta Cancer Foundation, University Hospital Foundation, AI-HS
• Industry
  – None

Objectives

• Overview of common pericardial diseases
  – Pericarditis
  – Pericardial Effusion
  – Constrictive Pericarditis
  – Pericardial Mass
• Review when CMR use is supported by guidelines
• CMR approach to disease detection and management
  – brief overview evidence for CMR use
Assessment of Pericardial Disease often a Multimodality Approach

CMR advantage
- Pericardial inflammation
- Myocardial disease
- Myocardial/pericardial mass

Acute Pericarditis

- Inflammatory pericardial syndrome with or without effusion
- Etiology
  - Infectious (viral > bacterial > fungal > parasitic)
  - Non-infectious (autoimmune > neoplastic > traumatic, drug related, metabolic)
- Treated NSAIDS/colchicine
- Recurrent Pericarditis in 15-30%
Acute Pericarditis Diagnosis

1. Axial localizers
2. SSFP cine imaging
   - Cardiac structure and function
3. T1/T2 Mapping / T2 DB
   - Edema
4. Late gadolinium enhancement imaging
   - Myocardial scar
   - Pericardial enhancement

CMR Approach Myopericarditis

1. Axial localizers
2. SSFP cine imaging
   - Cardiac structure and function
3. T1/T2 Mapping / T2 DB
   - Edema
4. Late gadolinium enhancement imaging
   - Myocardial scar
   - Pericardial enhancement

Case 1

- 43 year old woman
- Longstanding Crohn’s disease
- Acute chest pain
  - BP 93/65; normal JVP, no Kussmaul’s
  - ECG normal
  - Troponin I normal
  - CRP 139 mg/L (normal < 10mg/L)

- Treating MD ordered CMR to rule out myocardial involvement
Clinical Course

- Endoscopy: focal ileitis.
- Dx: Active IBD with cardiac involvement
- Treated with methylprednisolone and colchicine

5 week Follow-up Imaging
CMR in Recurrent Pericarditis

- 159 patients with recurrent pericarditis
- Quantitative LGE assessment
  - Threshold >6 SD normal myocardium

Incremental Prognostic Value of LGE for Clinical Remission


LGE volume <71 ml was associated with clinical remission.

Pericardial Effusion

Pathophysiology
- Inflammation of pericardium
- Decreased reabsorption due to high venous pressures (CHF / pulm HTN)

Etiology
- Idiopathic (up to 50%), infection (15-30%), cancer (10-25%), iatrogenic (15-20%), auto-immune (5-15%), TB (>60% in developing world)

Classification

<table>
<thead>
<tr>
<th>Object</th>
<th>Acute</th>
<th>Subacute</th>
<th>Chronic (&gt;3 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Mild (&lt;1 cm)</td>
<td>Moderate (2-5 cm)</td>
<td>Large (&gt;5 cm)</td>
</tr>
<tr>
<td>Distribution</td>
<td>Constrictive</td>
<td>Loculated</td>
<td>Exudate</td>
</tr>
<tr>
<td>Composition</td>
<td>Transude</td>
<td>Exudate</td>
<td>Emollient</td>
</tr>
</tbody>
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Pericardial Effusion

Recommendations for the diagnosis of pericardial effusion:
- Transesophageal echocardiography is recommended in patients with suspected pericardial effusion.
- Other diagnostic tests may be helpful in patients without a suspicion of pericardial effusion.
- Studies of markers of pericardial effusion are not recommended.
- CT and MRI should be considered in patients with suspected pericardial effusion, pericardial thickening and effusion, or as an additional test.

CMR = Cardiac magnetic resonance, CRF = C-reactive protein, CT = Computed tomography.

* = Class of recommendation;
C = Consensus of evidence.
CMR Approach to Pericardial Effusion

1. Axial localizers
2. SSFP cine imaging
   - Pericardial effusion size
   - Cardiac structure and function
3. Free breathing cines
4. T1/T2 Mass Characterization
5. Late gadolinium enhancement imaging

Case 2

- 59 year old man
- Heart transplant 8 years ago, known pericardial effusion
- Worsening exercise tolerance
- Looks unwell, tachypneic
- Low renal function

Axial HASTE
Clinical Course

- Patient admitted for urgent pericardiocentesis
- Biopsy confirmed allograft rejection
CMR Reporting of Pericardial Effusion

- Size
- Distribution
- Hemodynamic Effects
  - None
  - Effusive-constrictive
  - Tamponade
- Pericardium
  - Thickness (normal <2mm)
  - Inflammation

Constrictive Pericarditis

Rare complications of pericarditis
- < 1% viral/idiopathic
- 2-3% immune mediated or neoplastic
- 20-30% bacterial

Etiology
- viral/idiopathic (42-49%)
- post-surgical (11-37%)
- post-radiation (9-31%)
- developing world TB is major cause

Therapy
- Surgery
- Medical therapy
  - 10-20% reversible with anti-inflammatory Rx, CT/CMR may have a role in identification

Constrictive Pericarditis Diagnosis
CMR Approach to Constrictive Pericarditis

1. Axial localizers
2. SSFP cine imaging
   − Pericardial effusion size
   − Cardiac structure and function
3. Free breathing cines
4. T1/T2 Mapping / T2 DB
   − Edema
5. Late gadolinium enhancement imaging

Clinical Case

• 45 year old man
• Pericarditis 4 months prior
• Exercise intolerance, abdominal bloating

Axial HASTE
SSFP Cines

LVEF 59%

Free Breathing Cine

Tissue Characterization
Clinical Course

- Failed trial of anti-inflammatory meds
- CT chest no pericardial calcification
- Good result with pericardiectomy

LGE Predicts Clinical Improvement With Medical Therapy

N=43 patients with constrictive pericarditis

LGE thresholding > 6SD normal myocardium

Cut-point for Pericardial LGE > 53ml


CMR Approach Pericardial Mass

1. Axial localizers
2. SSFP cine imaging
   - Pericardial effusion size
   - Cardiac structure and function
3. T1/T2 Mapping / T2 DB
   - Mass characterization
4. Late gadolinium enhancement imaging
   - Mass characterization
Summary

- Assessment of pericardial disease usually a multimodality approach although CMR is the most comprehensive

- Recommended use in
  - Myopericarditis
  - Constriction
  - Pericardial mass
  - Possibly recurrent pericarditis

- Volume LGE may predict clinical outcomes

Acknowledgements

MAHI
- Craig Butler
- Justin Ezekowitz
- Gavin Oudit
- Richard Coulden
- Emer Sonnex
- Kate Mracek
- Haran Yogasundaram

Basic Science
- Richard Thompson

Thank You!