Constrictive Pericarditis
Never Confused with Anything Else

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ARS #1 CP
Which of following patients has constrictive pericarditis?

1 2 3

Medial e’ 13 cm/s  Medial e’ 3 cm/s  Medial e’ 14 cm/s
Learning Objectives
Based on 9 Cases

• Identify constriction easily by 4 parameters
  • Ventricular septal motion abnormality
  • Mitral inflow velocity ≥ Grade 2
  • Mitral annulus medial e’ ≥ 8 cm/sec
  • Hepatic vein diastolic expiratory flow reversal

• Identify mimickers of constriction
  • Restrictive CM
  • Severe TR
  • Interventricular dependence of other causes

Echocardiographic Diagnosis of Constrictive Pericarditis: Mayo Clinic Criteria
Terrence D. Welch, Liang H. Ling, Raul E. Espinosa, Nandan S. Anavekar, Heather J. Wiste, Brian D. Lahr, Hartnell V. Schaff and Jae K. Oh

Echo Diagnostic Criteria

Septal motion abnormality

Hepatic Vein Diastolic reversal with expiration

MV Flow Velocity
Restrictive (E/A >1)

Medial e’ ≥ 8 cm/s

Sensitivity 87 %
Specificity 91 %

Welch et al Circ Imaging 2014
Hemodynamics in Constriction

Intracardiac pressure $\Delta <$ intrathoracic pressure $\Delta$

Interventricular dependence

Tissue Doppler in Constriction vs Restriction

E’ normal to high in constriction, low in myocardial disease
### Normal vs RCM vs CP

**Medial Mitral e’ velocity (LV Relaxation)**

- **Normal**
  - Medial e’ 13 cm/s

- **RCM**
  - Medial e’ 3 cm/s

- **CP**
  - Medial e’ 14 cm/s
  - Usually > Lateral e’ (Annulus Reversus)

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#### Case # 1

**27 yo man with fatigue and dyspnea**

- Sep. 2015…Flu-like symptoms, treated with inhaler
- Oct. 2015…Pre-syncopy and palpitation
  - Pericardial rub
  - Pericardial effusion on Echo
  - Treated with Ibuprofen 2400 mg/d Colchicine 0.6 mg BID
- Not feeling better and CRP 60
- Underwent pericardial window
27 year old man underwent a window

Referred to Mayo

- Pericardial fluid …studies were negative
- Not feeling better
- RUQ abdominal pain and fatigue
- U/S…Enlarged gallbladder and liver
- Consideration of cholecystectomy

Interventricular Dependence and IVC Plethora

Constrictive Pericarditis
27 yo man after pericardial window

Hepatic Vein Expiratory Diastolic Flow Reversal

Mitral Inflow

Mitral e' = 15 cm/sec

Case #2

A 27 yo woman with dyspnea
Marked Septal Motion Abnormality
A 27 yo woman with dyspnea
Constrictive Pericarditis?

1. E’ is increased
2. Septal motion abnormality
3. Mitral inflow variation

A 27 yo woman with dyspnea
Pulsus Paradoxus with Asthma

Mitral Inflow

E’ = 10 cm/sec

IVC

Mitral Inflow

E’ = 10 cm/sec

HV
Constrictive vs COPD/Asthma
SVC Flow Velocities

COPD

Constriction


71 year old man with dyspnea 2 years after CABG
Case # 3

- Physical Examination
  - JVP elevation
  - Prominent S3
  - Peripheral edema
- Cath: Equalized end-diastolic pressures
- CT was obtained: Calcified Pericardium
71 year old man with calcified pericardium

Amyloidosis

72 yo woman with massive edema/ascites and JVP elevation was referred to pericardial disease clinic for ? pericardiectomy

Severe TR with Systolic Flow Reversals in the HV
Heart failure with ascites and leg edema
Referred for TV repair

Diastolic Flow Reversals in the HV

Annulus Reversus
Severe TR and CP

Medial 12 cm/sec
Lateral 9 cm/sec
Hepatic Vein Doppler is a Key

Constriction

Myocardial Disease

Severe TR

67 year old man with severe AS came for AVR

Low Flow Low Gradient AS

\[
SV = (1.9)^2 \times 0.785 \times 21 = 60 \text{ cc}
\]

AVA = \frac{60}{76} = 0.79 \text{ cm}^2
67 year old man with heart failure and LFLG AS
Mitral Annulus Tissue Doppler

- E = 100 cm/s
- Medial e' = 9 cm/s
- Lateral e' = 6 cm/s

67 year old man with AS and Constriction
Hepatic Vein Doppler c/w constriction

- Radiation Heart Disease
- Valvular Heart Disease

Low-Flow, Low-Gradient Severe Aortic Stenosis in the Setting of Constrictive Pericarditis
Clinical Characteristics, Echocardiographic Features, and Outcomes

Circulation CV Imaging 2015
23 year old woman from Middle East with ascites several month after acute pericarditis and pericardial effusion

Medial e’ = 14 cm/s  Lateral e’ = 11 cm/s

Case #8  23 year old female with thrombotic CP

Courtesy of H. Schaff, MD
Case #7

Constriction with Atrial Fibrillation

Medial e’ = 11 cm/s
Lateral e’ = 7 cm/s

Constriction with A. Fibrillation After Cardioversion
77 yo man with severe aortic stenosis
TAVR and PM implantation

Pericardiocentesis yielded
125 cc of bloody fluid

Increasing HF and edema
2 months later

Effusive-Constrictive Pericarditis

Interventricular Dependence
• 205 consecutive patients with pericardiocentesis
• ECP was diagnosed in 33 (16%)
  • More frequent hemo-pericardium (33% vs 13%)
  • Higher % of neutrophils
  • Baseline medial mitral annulus e’ higher
  • Expiratory diastolic flow reversal in HV more frequent
  • 2 required pericardiectomy in 3.8 year follow-up
Transient Constrictive Pericarditis
One week of Steroid Rx

An e-mail from a junior staff
52 year old man waiting for heart transplantation
(had Echo, Cath, and MRI)

Diastolic Reversal Flow with Expiration
Teaching Points: It is now easy to diagnose CP
Do Not Miss Constriction

- We can identify constriction by 4 parameters
  - Ventricular septal motion abnormality
  - Mitral inflow velocity $\geq$ Grade 2
  - Mitral annulus medial $e'$ $\geq$ 8 cm/sec
  - Hepatic vein diastolic expiratory flow reversal

- We should be able to identify mimickers of constriction
  - Restrictive CM
  - Severe TR
  - Interventricular dependence of other causes
Thank You for Listening!
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Questions & Discussion