Etiology of Heart Failure

Introduction:

- The etiology of HF is the cause of the initial cardiac injury/abnormality.
- Heart failure should not be the final diagnosis.
- Not all HF are the same. Different etiologies lead to different clinical course and prognosis.
- There could be specific treatments for specific etiology. Sometime reversible.
- With best attempt, in 50% of cases of non-ischemic cardiomyopathy are unknown or idiopathic.
- Pay attention to reversible, treatable cause. Patients want to know why they have HF

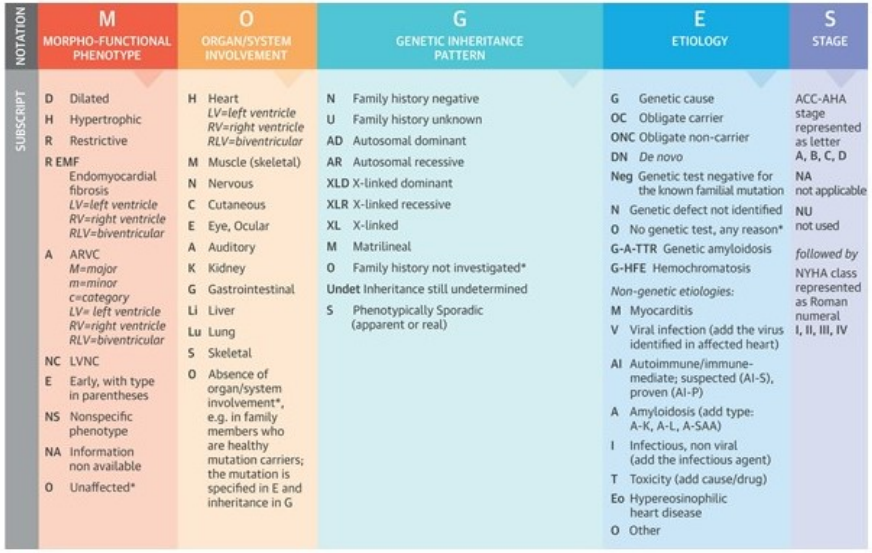
Etiology:

- 60% ischemic: One of the most common and treatable etiology of HF.
  - Acute HF as a complication from acute coronary syndrome, e.g. large STEMI.
  - Chronic HF or asymptomatic LV dysfunction after CAD/MI
  - Stunning, hibernating, microvascular dysfunction.
- 40% non-ischemic:

System	Selected specific etiology
Coronary artery disease related	- Previous myocardial infarction - scar - Hibernating myocardium - Stunting myocardium - Microvascular myocardial dysfunction - Acute coronary syndrome
Cardiovascular abnormality	- Cardiomyopathy (CM) due to hypertension - Familial, genetic related CM e.g. HCM, DCM, LVNC, ARVC - Valvular heart disease - Tachycardia-induced cardiomyopathy - Congenital heart disease - Pericardium e.g. constrictive pericarditis - Restrictive cardiomyopathy
Infection/ inflammation	- Viral e.g. HIV, CMV, HSV - Myocarditis - Parasite e.g. Chagas disease
Rheumatology	- Rheumatoid arthritis - Systemic lupus erythematosus - Scleroderma
Toxin	- Alcohol - Chemotherapy e.g. doxorubicin, trastuzumab - Methamphetamine - Cocaine - Heavy metal e.g. copper, lead
Endocrinology	**- Abnormality in thyroid hormone** **- Abnormality in growth hormone** **- Abnormality in adrenal release hormone e.g. pheochromocytoma or adrenal insufficiency** **- Cardiomyopathy due to diabetes**
Immunology	- Lymphocytic myocarditis - Giant cell myocarditis - Hypersensitivity and eosinophilic myocarditis - Endomyocardial fibrosis
Infiltrative disease	- Amyloidosis - Sarcoidosis - Hemochromatosis (iron) - Glycogen storage diseases e.g. Pompe disease - Lysosomal storage diseases e.g. Fabry disease
Others	- Stress-induced CM - Peripartum CM - Nutrition deficiency e.g. thiamine, selenium - Tumor, neoplasm (primary or metastasis) - High output stage e.g. anemia, arteriovenous malformation - Muscular dystrophy
Unknown	- Idiopathic CM

Cardiomyopathy: (Eur Heart J 2008;29: 270.)

- Cardiomyopathy is a disease of the myocytes. Includes genetics (HCM, LVNC, ARVD/C, glycogen storage, DCM, RCM) and acquire (myocarditis, takotsubo, peripartum, tachycardia induced)
- In the most specific definition, it does not include scar, valvular, hypertensive, ischemic cardiomyopathy.
- MOGE(S) classification has been proposed to help with nomenclature of cardiomyopathy (JACC 2014;64:304.)



Investigation of new diagnosed patient with HF:

- Always starts with a thorough history (include ROS) and physical examination.
- Natriuretic peptide (BNP or NT-proBNP) when added to clinical info can increased accuracy of diagnosis (BNP NEJM 2002)
- Routine labs may include CBC, BUN, Cr, electrolyte, Ca, P, Mg, FBS, HbA1C, urine analysis, lipid panel, LFT.
- Routine cardiac investigation may include chest x-ray, ECG, and echocardiography.
- With a suspicious of some diseases, investigation may consider
  - Coronary angiogram, stress test, coronary imaging. (Only 25% of HF patients received CAD work up JACC 2016;68:450.)
  - TSH
  - HIV test
  - Ferritin, iron, TIBC
  - CRP, ESR, ANA and rheumatology test
  - Sleep study
  - Genetic counselling and testing: need 3 generation of FH
  - Holter monitor
  - Left and right heart catheterization
  - Cardiac MRI: Can evaluate tissue, function and morphology. No radiation. No contrast.
  - Endomyocardial biopsy: Gold standard for myocarditis, infiltrative, glycogen storage disease

Thai-ADHERE (CVD Prev and Cont2010;5:89)

Causes	*n* = 2041	*n* (%)
Cause of HF		
Coronary heart disease	913	(44.7)
Valvular heart disease	382	(18.7)
Cardiomyopathy	283	(13.9)
Hypertensive heart disease	249	(12.2)
Myocarditis	5	(0.2)
Cor pulmonale	8	(0.4)
Pericardial disease	12	(0.6)
Other	123	(6.0)
No mention	66	(3.2)

Recommend reading

- Classification of the cardiomyopathies: a position statement from the.Eur Heart J. 2008 Jan;29(2):270-6.
- Underlying Causes and Long-Term Survival in Patients with Initially Unexplained Cardiomyopathy. N Engl J Med 2000; 342:1077-1084.