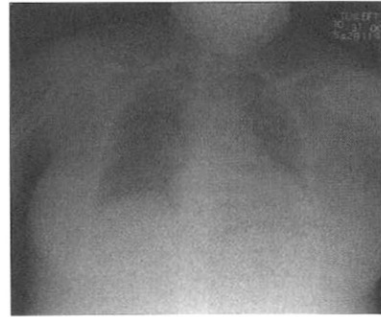


Hemodialysis Patients에서 Cardiac Evaluation의 중요성과 LV Dysfunction의 Management

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36 year-old Female with history of hypertension and DM complicated by retinopathy, neuropathy and ESRD presents with edema and jaundice for several weeks



Echocardiogram:

Ejection Fraction: 60%

No RWMA

Cardiac Output/ Cardiac Index :

4.5 l/min; 2.73 l/min/m²

What's the cause of HF?

Ventricular Function

Systolic
Function

Diastolic
Function

Ejection Fraction

Only examines the difference in cavity area at systole and end-diastole

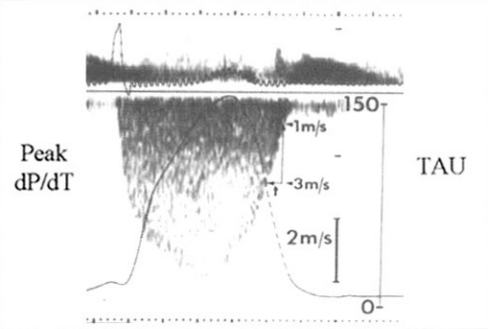
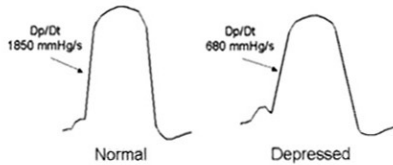
- Does not measure the contraction of the "muscle"
- Dependent upon cavity size
- Dependent upon load

What is EF?

$$EF = \frac{CO}{HR \times LVEDV}$$

Left Ventricular Function
Systolic Function

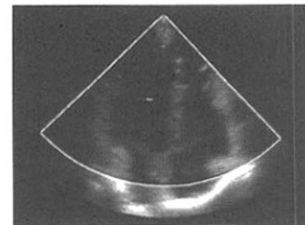
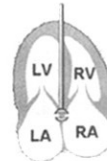
Rate of Pressure Rise : Simple Dp/dt



Left Ventricular Function
Systolic Function

Doppler Tissue Imaging

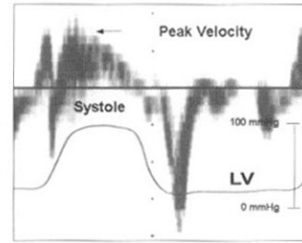
Tissue Doppler Echo
Mitral Annulus



Left Ventricular Function Systolic Function

• **Doppler Tissue Imaging** :
measures the velocity of
tissue rather than blood (using
the change in Doppler shift off
moving myocardium)

Doppler Tissue Imaging (Systole)



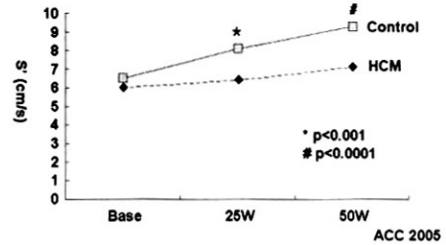
**Abnormal LV longitudinal contractile
reserve in the presence of hyperdynamic
radial contraction in patients with HCM:
Assessment with pulsed-wave tissue
Doppler exercise echocardiography**

Jong-Won Ha, Namsik Chung, Jin-Mi Kim, Jeong-Ah Ahn,
Seok-Min Kang, Se-Joong Rim, Yangsoo Jang, Won-Heum
Shim, Seung-Yun Cho

Yonsei University College of Medicine
Seoul, South Korea

ACC 2005

Change of S' with Exercise HCM vs Control



ACC 2005

Conclusion

- Even though radial contraction is more vigorous in patients with HCM, their longitudinal contractile reserve during exercise is reduced
- The assessment of longitudinal function should be incorporated for the comprehensive evaluation of LV systolic function and maybe the better parameter for earlier detection of LV systolic dysfunction

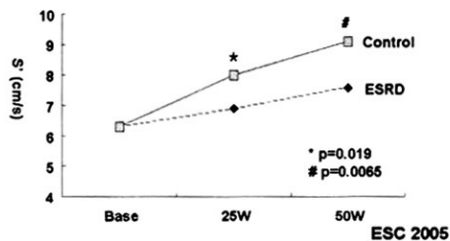
**Abnormal left ventricular longitudinal
contractile reserve in patients with end
stage renal disease: Assessment with
pulsed-wave tissue Doppler exercise
echocardiography**

Jong-Won Ha, Shin-Wook Kang, Namsik Chung, Jin-Mi
Kim, Jeong-Ah Ahn, Seok-Min Kang, Se-Joong Rim,
Yangsoo Jang, Won-Heum Shim, Seung-Yun Cho

Yonsei University College of Medicine
Seoul, South Korea

European Society of Cardiology 2005

Change of S' with Exercise ESRD (n=23) vs Control (n=58)



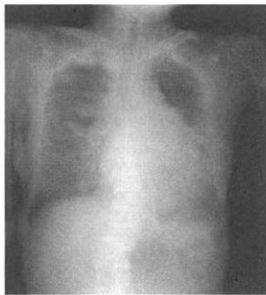
ESC 2005

Further new
insights in LV
longitudinal
systolic function

Radial contraction
vs
Longitudinal Contraction

CHF = Systolic Dysfunction

96 year-
Old
Woman
with
Severe
dyspnea



What about EF ?

- 1) 25%
- 2) 40%
- 3) 55%
- 4) 70%

Echocardiography



ARDS ??

NT ProBNP : 6,869 pg/ml
(normal range < 300)

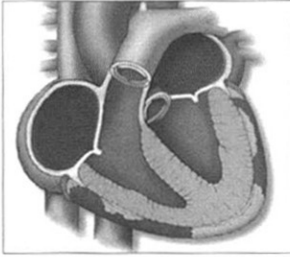
DIASTOLIC HEART FAILURE
Pooled Data (9 Studies)

- Total Number 15,843
- Mean Age 72 Yrs
- Prevalence 6.1%
- Normal EF 56%

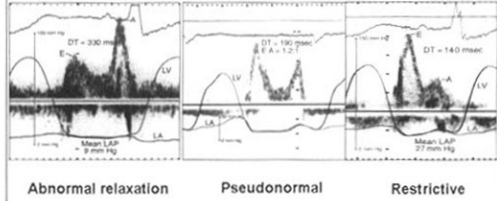
Modified from Lancet 358:432-434, Aug. 11, 2001

Diastolic heart failure is
common!

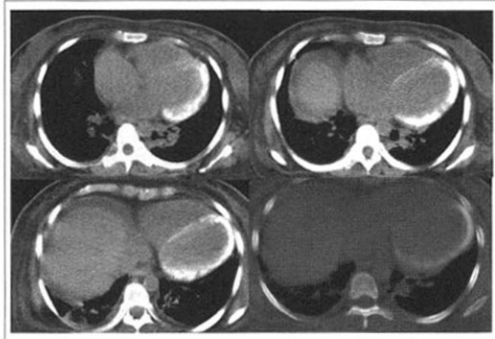
LV contraction and filling



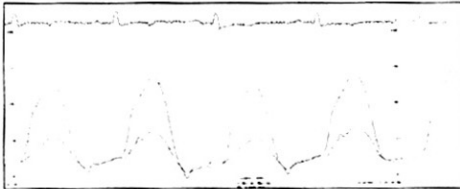
Diastolic Function: Mitral inflow



36 year-old Female with history of hypertension and DM complicated by retinopathy, neuropathy and ESRD presents with edema and jaundice for several weeks



Cardiac Catheterization



Pressure measurements:
LV: 146/18-28 (Tau 0.0623, dP/dT 1130)
RV 63/17-24, PCWP 20, RA 19

Diagnosis:

Mild systolic dysfunction with
marked diastolic dysfunction

Echocardiography

“The single most useful diagnostic test in the evaluation of patients with HF is the two-dimensional echocardiogram coupled with Doppler flow studies.”

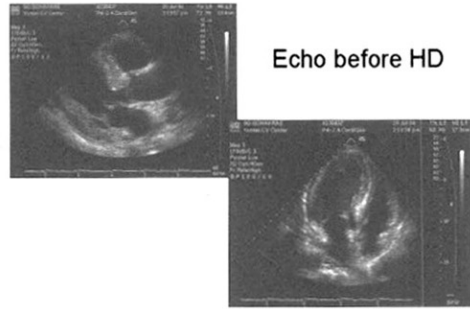
ACC/AHA Practice Guidelines 2001

• Hemodynamic assessment at the time of presentation is crucial

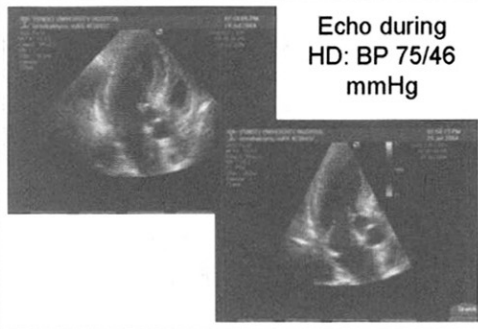
65 year-old man with ESRD on HD

- Recurrent hypotension during HD
- Echo: LVEDD 49, LVESD 27, EF 80%, MR 1
- Pre HD BP systolic 190-200 mmHg
- During HD, systolic 75 mmHg

Echo before HD



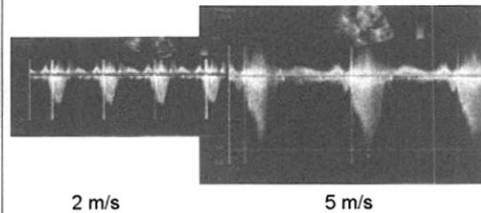
Echo during HD: BP 75/46 mmHg



LVOT velocity

Before HD

During HD



Cause of hypotension during HD

Dynamic LVOT obstruction

Hypertrophic Cardiomyopathy LVOT Obstruction

Increased by

↓ preload

↓ afterload

↑ contractility

Valsalva maneuver, sudden standing, NTG, amyl nitrite, tachycardia

Exercise, inotropics, digitalis