Echo Australia 16-10-2010

Now I have the tools, how do I use in

Restrictive Cardiomyopathy

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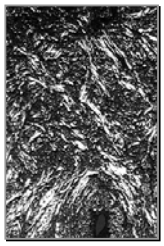
Conflicts: None

Introduction

- Amyloid: 'starch-like', first identified in humans by Virchow in 1854
- Amyloids: aggregations of undegraded protein fibrils because of misfolding mechanisms
- Amyloidosis: group of diseases characterized by insoluble extracellular deposition of amyloids



Classification Of Amyloidosis

Localized

- Alzheimers A-beta (Aβ)
- Diabetes Islet Amyloid Polypeptide (AIAPP)
- Calcitonin thyroid tumors (Acal)

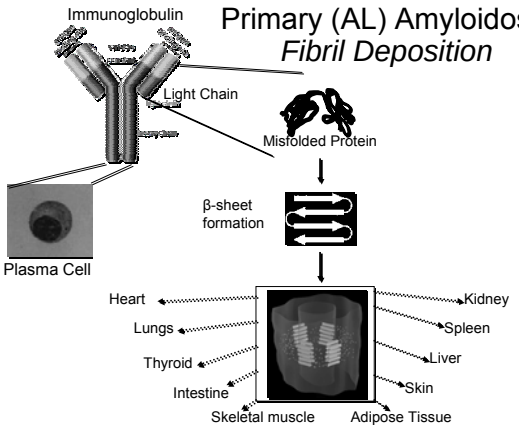
Systemic

- Primary (AL): Ig light chains (k or λ)
- Secondary (AA): Serum amyloid A protein (SAA)
- Familial (ATTR): Mutated form of transthyretin
- Senile: Wild-type transthyretin, ANP, etc

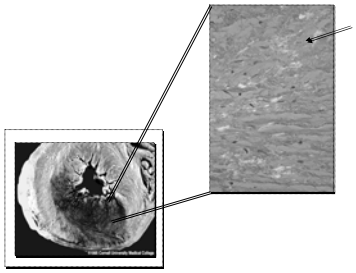
Cardiac Amyloidoses

- Primary (AL)
- Familial Transthyretin (ATTR, variant)
- Senile (ATTR, wild-type)

Primary (AL) Amyloidosis
Fibril Deposition



Cardiac Amyloidosis



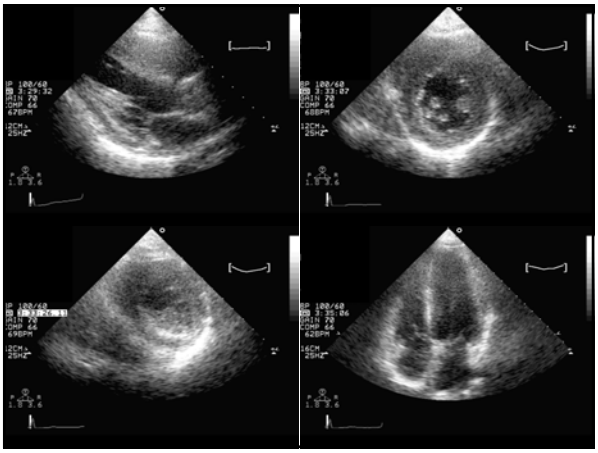
Worst prognosis with median survival <6 months and 5-year survival <10%

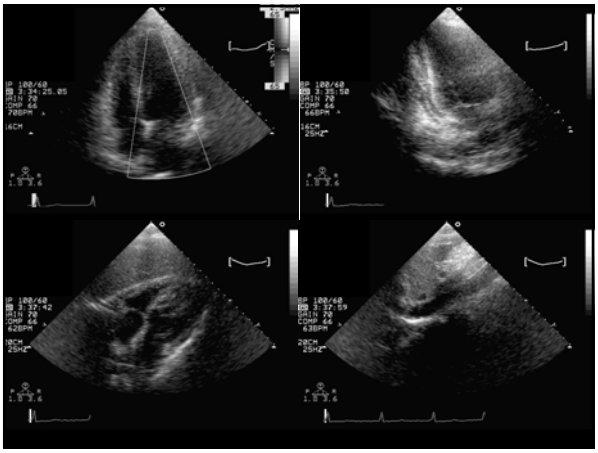
49/F, menopausal

- Presented 16-Jun-05
- LOW, LOA, N&V x 2 mo
- Dysuria, urgency, dizzy, backache
- PMH: Nil except Hep B carrier
- BP 120/80, HR 85
- No heart failure
- Liver 3 fb, firm

Lab Investigations

- Hb 13.6 /dL
- TW 8.3 x 10
- Plt 432 x 10
- FBG 4.5 mmol/L
- Urea 16.1 mmol/L
- Creat 585 μmol/L
- UFEME - nad
- ESR 99
- Ca 2.16 mmol/L
- myeloma panel - λ chains
- Bone marrow - 4% plasma cells
- Skeletal survey - nad





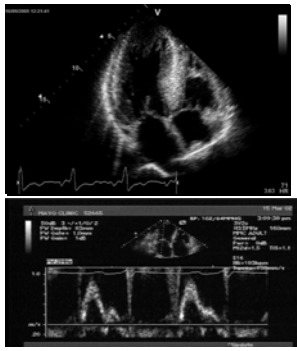
What is the Diagnosis?

A. LV hypertrophy
B. Amyloid heart
C. Hypertrophic cardiomypathy
D. Renal heart disease
E. Need more tests

Conventional Echo

2D
- ↑ LV and RV thickness
- Normal or mildly reduced volumes
- Normal EF
- Biatrial enlargement
- Pericardial and/or pleural effusion
- Thickened valves/IAS

Doppler
- Diastolic dysfunction

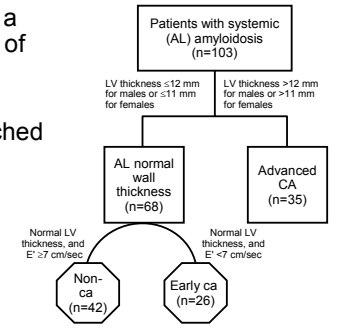


Standard 2D-Doppler Echo *Caveats*

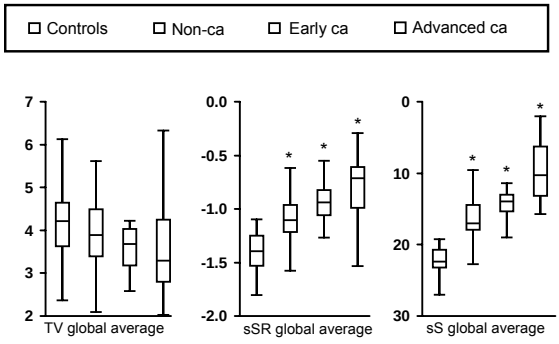
- Cannot confirm dx in isolation
- "Hypertrophy" has poor specificity
  - DDx: HHT, HCM, GSD, sarcoid, hemochromatosis, hyperoxaluria
  - ↑ LVM + ECG more sensitive (≤79%) and specific (≤100%)
- Sparkling myocardium
  - Not sensitive (≥26%), more specific (≤81%) ???

Case Control Study Design

- 103 patients with a proven diagnosis of primary systemic amyloidosis
- 32 age- sex-matched controls
- Classification:
  - LV thickness
  - E' velocity



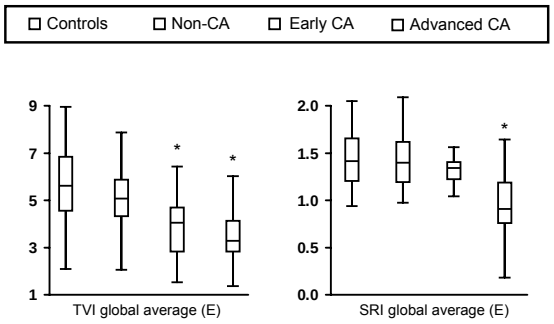
Longitudinal DMI: Systole



Bellavia et al. Am J Cardiol 2008;101:1039-1045

CP1237840-19

Longitudinal DMI: Diastole



Bellavia et al. Am J Cardiol 2008;101:1039-1045

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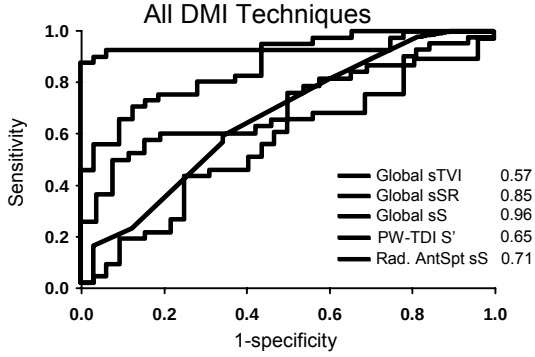
ROC: Non-CA vs Controls All DMI Techniques



Bellavia et al. Am J Cardiol 2008;101:1039-1045

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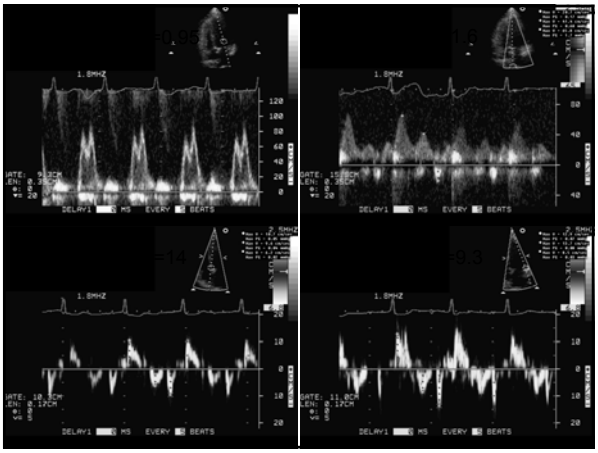
Strain Imaging in Amyloid

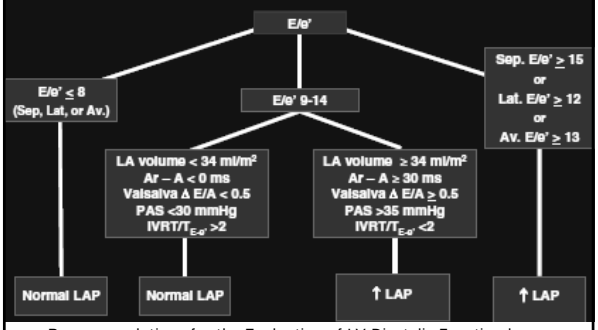
- Longitudinal systolic strain is the most accurate modality for early diagnosis of CA
- Global average, or average of 6 basal segments are most accurate. Mean of 3 (or even 2) basal segments not significantly different



Are Filling Pressures Raised?

A. No
B. Yes, left-sided
C. Yes, right-sided
D. Yes, both

Estimation of Filling Pressures in Patients with Normal EF

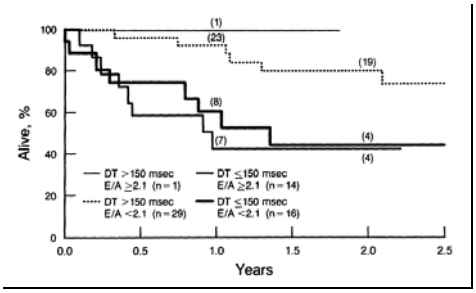


Recommendations for the Evaluation of LV Diastolic Function by Echocardiography, ASE 2009

Will She Have a Good Outcome?

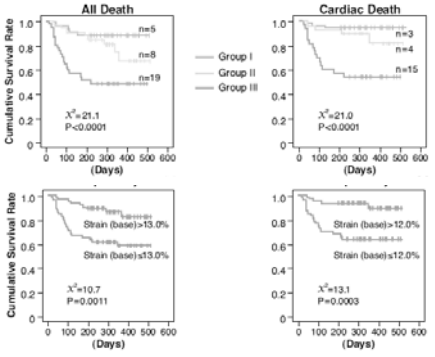
A. Yes
B. No
C. Can't tell, need more data

Standard Echo
Evolution of Cardiac Fx

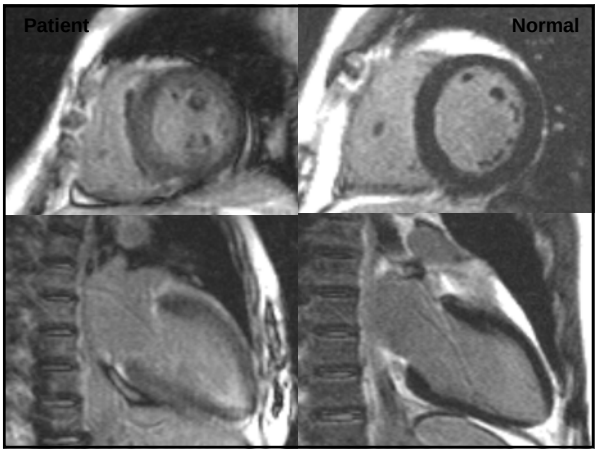


Klein. Circulation 1991;83;808-81

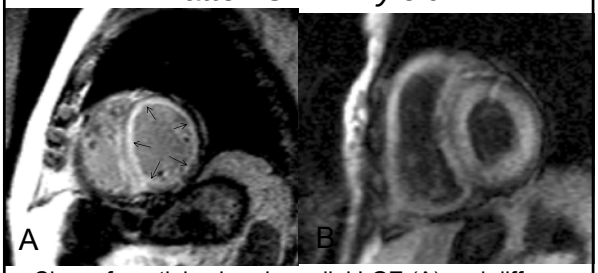
Prognosis in Amyloid: Strain Imaging



Koyama, Falk. *J Am Coll Cardiol Img* 2010;3:333–42



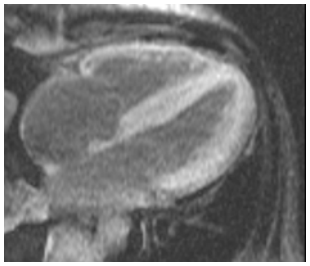
LGE Common in Amyloid Heart
Patterns in Amyloid



Circumferential subendocardial LGE (A) and diffuse LGE (B) in myocardium

Maceira. Circulation 2005;111:186-93
Perugini. Heart 2006;92:343-9

Late Gadolinium Enhancement



Transmural extension and number of enhanced segments correlated with LVEDV, LVESV, LA size

More diffuse LGE associated with poorer LV fx

Perugini. Heart 2006;92:343-9

Progress

23-Aug-05

- SOB, lethargy, leg edema
- Labs: Hb 8.5 g/dL, Na 113 mmol/L, Creatinine 882 μmol/L
- Hemodialysis commenced

30-Jun-06 s/p PBSCT

12-Jul-06 Demise

Conclusions

- Echo (and CMR) are useful tools for assessment of RCM
  - –New modalities provide pathophysiologic info beyond standard echo
  - –prognostication
  - –monitor effects of Rx