

Poster presentation

Hypointense T2 signal predicts worse prognosis in cardiac amyloidosis

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Introduction

T1-weighted CMR can visualize inhomogeneous contrast enhancement in cardiac amyloidosis. Accumulation of large molecules can change T2-relaxation. Cerebral amyloid appears hypointense in T2-weighted imaging.

Purpose

We investigated T2 signal in patients with amyloidosis and its relation to prognosis.

Methods

We prospectively investigated 36 patients with biopsy-proven amyloidosis in a 1.5 T scanner. Amyloidosis type was AL in 32, AA and TTR in 2 cases, each. We obtained SSFP-based long axis cine loops and T2-weighted triple inversion fast spin echo images in short axis (slice thickness 20 mm, TE 64 ms, TR = 2 RR), followed by inversion recovery gradient echo images after 0.2 mmol/kg bw Gd-DTPA. LV mass, volume, ejection fraction and left atrial area were measured based on biplanar long axis images. T2 ratio was computed as myocardial over skeletal muscle signal intensity in the same image to exclude effects of heart rate. Late enhancement images were evaluated visually for the presence of hyperintense lesions. Outcome was confirmed by chart review and contact of the referring clinician. Results were compared between surviving and deceased patients. In Kaplan-Meyer and Cox regression analysis we tested the predictive value for survival.

Results

Median follow-up was 7 months. 23 (64%) patients died. Median time to death was 4 months. 23/36 patients were

hypertrophic. Mean LV mass was 205 ± 70 g. LVEF was $55 \pm 12\%$. Biplanar left atrial area was slightly increased with 26 ± 0.6 cm². T2-ratio was low with 1.5 ± 0.4 . 33/36 (92%) patients had small pericardial effusions. All but 2 had an inhomogeneous enhancement pattern in late images, Figure 1.

Surviving patients did not differ from those that had died in age, sex, LV mass or LVEDV. Surviving patients had a significantly higher LVEF ($60.4 \pm 9.9\%$ vs. $51.6 \pm 11.5\%$; $p = 0.03$). The deceased patients had a lower T2 ratio than those that did survive (1.38 ± 0.42 vs. 1.76 ± 0.17 ; $p = 0.005$). Kaplan-Meyer analysis confirmed the relation between shortened survival and low T2 (log rank Chi

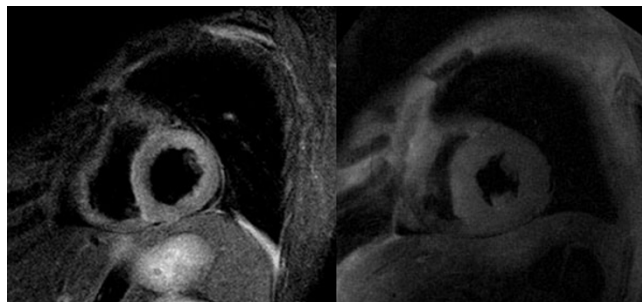


Figure 1
T2-weighted images show hyperintense myocardium on the left (patient still alive) and hypointense myocardium on the right (patient deceased 1 week after CMR).

square 14.3; $p < 0.001$). Cox regression analysis confirmed EF (score 4.6; $B = 0.059$; $p = 0.04$) and T2 ratio < 1.5 (score 11.6; $B = 2.4$; $p = 0.002$) as the only independent predictors for survival.

Conclusion

Cardiac amyloidosis appears hypointense on T2-weighted images. A lower T2-ratio and, to a lesser extent, low LVEF predicted early death. T2-weighted imaging may be refined into measurement of T2-times for prognostic information in cardiac amyloidosis.

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