Significance of myocardial mass and volume geometry evaluated by magnetic resonance imaging in predicting refractoriness to medical treatment in patients with hypertrophic obstructive cardiomyopathy

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Purpose

- Advanced shape of hypertrophic obstructive cardiomyopathy (HOCM) often lacks adequate left ventricular (LV) volume according to evolving gross LV hypertrophy. These patients often deteriorate with heart failure or developing fatal ventricular tachycardia and sudden cardiac death.
Hypothesis

• We tested cardiac magnetic resonance imaging (MRI) could be a valuable indicator of disease severity in patients with HOCM.
Methods

• Consecutive **eighty patients** with HOCM were referred with significant symptoms and underwent cardiac **MRI** between December 2007 and January 2010.

• Cardiac MRI was assessed to measure **Myocardial Mass (MM) (g)** and **Left Ventricular End Diastolic Volume (LVEDV) (ml)**, and a value of **MM/EDV(g/ml)** was used as Mass Volume(MV) ratio.
Mass Volume Ratio

\[ \text{Myocardial Mass (g)} \div \text{Left Ventricular End Diastolic Volume (ml)} \]
• Following four parameters were compared with MV ratio in view of clinical outcome whether medically controlled or percutaneous alcohol septal ablation (PTSMA) performed.

• NYHA functional class
• Echocardiographic parameters (LV outflow peak velocity)
• IVST / LVPWT ratio
• magnitude of late gadolinium enhancement (LGE)
• PTSMA was strictly indicated in cases with refractory symptoms on multiple drug regimens.
Results

The MV ratio of eighty patients was $1.05 \pm 0.34$ g/ml correlation with

- IVST/LVPWT ratio ($r=0.39$, $p=0.007$)
- magnitude of LGE ($r=0.46$, $p=0.001$)

no correlation with

- LV outflow peak velocity ($p=0.15$)
- NYHA functional class ($p=0.77$).
• Patients controlled with drug treatment showed significantly low value compared with those required PTSMA due to refractory heart failure symptom (0.90±0.27, 1.17±0.33, p=0.001, respectively).
1.17 ± 0.33

0.90 ± 0.27

p = 0.001
The MV ratio 0.95 g/ml can delineate patients who are well controlled medically from those requiring PTSMA by sensitivity 67%, specificity 80%.
HOCM with PTMSA

MV Ratio

LV Mass (g)
Normal

MV Ratio vs LV Mass (g)
Severe Aortic Stenosis

MV Ratio

LV Mass (g)
LV Mass (g) with HTN

MV Ratio
Case With PTSMA

67y/o Female
NYHA II→I
LVOT PG: 145→13mmHg
LV Mass: 103g
EDV:96.8ml
MV Ratio:1.06
EF: 70%
Carvedilol 20mg
Case With Medication

76y/o male
NYHA II → I
LVOT PG: 150 → 7mmHg
LV Mass: 78g
EDV: 85ml
MV Ratio: 0.91
EF: 59%
Bisoprolol 2.5mg
Cibenzoline 150mg
Conclusion

• The parameter Mass Volume ratio, derived from myocardial mass and volume geometry, may demonstrate disease deterioration and good indicator of refractoriness to medical treatment.