**Full Title:** Strain Echocardiography in Patients with Methamphetamine Abuse and Heart Failure with Preserved Ejection Fraction

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**Background:**

Methamphetamine abuse (MA) is an increasingly common cause of dilated cardiomyopathy. However, many patients with MA have heart failure with preserved ejection fraction (HFpEF). It is unknown if MA is associated with occult systolic dysfunction, and if this improves with MA cessation.

**Methods:**

A retrospective cohort of patients with HFpEF with and without MA with serial echocardiograms at a single academic center was evaluated. MA was assessed by urine toxicology. Myocardial strain analysis was performed on baseline echocardiograms and echocardiograms at 1 year using EchoInsight software (Epsilon Imaging, Ann Arbor, MI). Patients with MA cessation, continued MA, and no history of MA were compared.

**Results:**

Patients with MA (n=31) were younger (49±10 vs 59±16 years, p<0.01) and more frequently male (55% vs 26%, p=0.04) than patients without MA (n=23). At baseline, there were no differences in ejection fraction (EF) (median 66% [IQR 58, 71%] vs 62% [56, 69%], p=0.33) or global longitudinal strain (GLS), which was abnormal in both groups (-13.0% [-16.3, -10.9%] vs -14.8% [-16.0, -11.3%], p=0.40). At one-year follow-up, MA cessation (n=15) was associated with improvement in GLS (absolute change from baseline -4.4% [-6.5, -1.7%], p<0.01), while no change was observed in those with continued MA (n=16) (absolute change from baseline 0.74% [-1.2, -2.8%], p=0.22) or those without MA (absolute change from baseline -0.6% [-2.1, 2.8%], p=0.78). Of those with abnormal baseline GLS, normalization was observed in 50% in the MA cessation group, none in the continued MA group, and 5% in the no MA group (p<0.001). No change in EF was noted in follow-up in any group. Within the MA group, improvement in GLS was associated with a decrease in HF admissions per year with HR of 0.74 [95% CI 0.55, 0.98, p=0.04].

**Conclusions:**

Patients with MA and HFpEF have occult systolic dysfunction as demonstrated by abnormal GLS, and MA cessation at 1 year is associated with improvement in GLS, which translates to an improvement in HF admissions.