

# Coronary Flow Parameters Assessed by Transesophageal Echocardiography in Patients with Coronary Artery Ectasia Baseline Measurements and the Effects of Intravenous Verapamil

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## Abstract

**Background and rationale:** Coronary artery ectasia (defined as luminal dilatation 1.5 to 2 times the adjacent healthy coronary artery or the diameter of the corresponding coronary artery in the control group in case of diffuse ectasia) is an uncommon disorder, usually associated with underlying myocardial ischemia. Micro-circulatory dysfunction has been demonstrated as one possible mechanism to explain ischemia in this disorder. Calcium antagonists have been proven to relieve microvascular spasm.

**Aim of the study:** To test the hypothesis that relieving microvascular spasm in patients with coronary artery ectasia, through intravenous administration of verapamil, may result in improvement of microvascular coronary flow as reflected by coronary flow parameters assessed by transesophageal echocardiography (TEE).

## Patients and methods:

Thirty patients with angiographically documented coronary artery ectasia of the left anterior descending artery were prospectively enrolled in the current study. Ten patients with normal coronary arteries were included as controls. All forty patients underwent TEE using pulsed wave Doppler (PWD) to measure peak systolic and diastolic velocities (m/sec); systolic, diastolic and total velocity time integrals (cm); and the systolic, diastolic and total coronary blood flow (cm<sup>3</sup>/min) in the proximal LAD before and after intravenous injection of verapamil (0.1 mg/kg).

**Results:** Resting systolic, diastolic, and total coronary blood flow (cm<sup>3</sup>/min) were significantly higher in patients with ectasia compared to normal subjects (60.83 ± 27.7 cm<sup>3</sup>/min versus 25.31 ± 9.01 cm<sup>3</sup>/min, p<0.001; 126.89 ± 49.22 cm<sup>3</sup>/min versus 53.15 ± 18.30 cm<sup>3</sup>/min, p<0.001; and 188.02 ± 70.36 cm<sup>3</sup>/min versus 78.46 ± 25.97 cm<sup>3</sup>/min, p<0.001). There was a trend, not reaching statistical significance, towards higher basal peak velocities in normal subjects compared to patients with ectasia. In patients with coronary artery ectasia, intravenous injection of verapamil resulted in an increase in all observed coronary flow parameters including: peak systolic velocity (m/sec) from 0.19 ± 0.05 to 0.21 ± 0.04, p=0.05, peak diastolic velocity (m/sec) from 0.39 ± 0.11 to 0.48 ± 0.15, p<0.001, systolic velocity time integral (cm) from 3.0 ± 1.05 to 3.38 ± 0.78, p<0.05, diastolic velocity time integral (cm) from 6.22 ± 1.97 to 8.42 ± 2.09, p<0.001; total velocity time integral (cm) from 9.22 ± 2.73 to 11.8 ± 2.64, p<0.001, systolic coronary blood flow (cm<sup>3</sup>/min) from 60.83 ± 27.7 to 69.0 ± 22.7, p<0.05, diastolic coronary blood flow (cm<sup>3</sup>/min) from 126.89 ± 49.22 to 173.01 ± 62.4 p<0.001, and total coronary blood flow (cm<sup>3</sup>/min) from 188.02 ± 70.36 to 242.0 ± 81.82, p<0.001.

**Conclusion:** Intravenous administration of verapamil resulted in statistically significant improvement of coronary flow parameters in patients with coronary artery ectasia. Further studies are needed to confirm whether continued treatment with verapamil translates to symptomatic improvement in the clinical setting.

**Keywords:** Coronary artery ectasi; Micro-circulatory dysfunction; Coronary blood flow