Sildenafil Citrate (Viagra) Induces Powerful Cardioprotective Effects During High Dose Dobutamine Stress

Background:
We recently demonstrated that sildenafil citrate, a potent phosphodiesterase-5 inhibitor, induces a preconditioning-like effect through synthesis of nitric oxide and opening of mitochondrial KATP channels in adult rabbits. The purpose of this study was to determine the effects of sildenafil on myocardial functional improvement and infarct size reduction during ischemia/reperfusion injury in infant rabbits.

Methods:
8-week-old rabbits were treated with sildenafil (0.7mg/kg IV) or saline 30 minutes prior to ischemia. Ischemia was induced by occluding the left anterior descending (LAD) artery for 60 minutes. After reperfusion, rabbits were sacrificed and the heart was removed for analysis. The left ventricular myocardium was analyzed for myocardial velocity components from endocardium to epicardium using intracoronary Doppler imaging.

Results:
1. In the region of perfusion defect by scintigraphy, the MVP at rest showed linear correlation of MVP with infarct size, with a decrease in the slope of the linear regression line (myocardial velocity gradient) (5.01 vs 2.01 cm/s, p<0.001).

2. During high dose DSE, the peak systolic velocities at sub-endocardial region significantly decreased (3.99 vs 1.49 cm/s, p<0.001) resulting in the decrease in the slope of the linear regression line (myocardial velocity gradient) 5.01 vs 0.95 ± 1.1 cm/s, p<0.001.

Conclusions:
MVP obtained by color TDI clearly demonstrated changes in transmural velocity distribution during DSE. Deterioration of the myocardial contractility in ischemic region by high dose DSE can be precisely evaluated by observing decrease in myocardial velocity gradient reflecting decrease in subendocardial velocities.