

Real-time myocardial contrast echocardiography for echo-guided alcohol septal ablation

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Abstract

Alcohol septal ablation (ASA) for hypertrophic obstructive cardiomyopathy is performed through a percutaneous approach, in which 1-3 ml of absolute alcohol is introduced into the septal branch to create a controlled septal infarction of the basal interventricular septum with its subsequent shrinkage and outflow gradient elimination. During the procedure, contrast myocardial echocardiography is performed to delineate the area to be infarcted and to exclude contrast (and subsequently alcohol) injection in remote myocardial regions. We report for the first time the new possibility to use the real-time myocardial contrast echocardiography with low mechanical index for the better visualization of target septa area during ASA.

Key words: hypertrophic cardiomyopathy, alcohol septal ablation, echocardiography.

Introduction

Until the early 1990s, surgical myectomy represented the standard treatment for patients with hypertrophic obstructive cardiomyopathy (HOCM) and drug-refractory symptoms. More than one decade ago, alcohol septal ablation (ASA) was introduced as a less invasive alternative therapy for symptomatic HCM patients with obstruction. Alcohol septal ablation is performed through a percutaneous approach, in which 1-3 ml of absolute alcohol is introduced into the septal branch to create a controlled septal infarction of the basal interventricular septum with its subsequent shrinkage and outflow gradient elimination (Figure 1). This procedure results in relief of symptoms, a decrease of pressure gradient and improvement of the left ventricular diastolic function [1-3].

During the procedure, contrast myocardial echocardiography is performed to delineate the area to be infarcted (Figures 2, 3) and to exclude contrast (and subsequently alcohol) injection in remote myocardial regions such as the left ventricular posterior wall or papillary muscles. The optimal septal branch is identified by opacification of the area in the basal septum which is adjacent to the zone of maximal acceleration of the outflow jet and includes the point of coaptation between the septum and the anterior mitral leaflet.

Several studies with echocardiographic monitoring of this procedure have been reported since 1996. Conventional harmonic imaging (CI) that was used in the past has some limitations regarding the presence of tissue



Figure 1. Parasternal long axis view; septum shrinkage (arrows) and left ventricular remodeling three months after ASA



Figure 2. Apical four chamber view; myocardial contrast echocardiography in conventional imaging



Figure 3. Apical four chamber view; low MI real-time myocardial contrast echocardiography utilizing power modulation and intracoronary injection of 0.2 ml of contrast agent SonoVue (Bracco, Milano, Italy)

harmonics, which results in lower contrast-to-tissue ratio (Figure 2). We demonstrate for the first time a clinical use of real-time myocardial contrast echocardiography with very low mechanical index (MI) for intra-procedural visualization of the target septal area during ASA (Figure 3).

The very low MI means that the bubble destruction by the incident ultrasound is minimal [4]. This technique improves (more than CI) visualization of regional perfusion in the target septal area, thereby defining the area and extent of future necrosis, and also prevents remote complications following induction of necrosis far from the basal interventricular septum. It seems to be likely that better visualization of the perfusion area of the septal branch using real-time contrast echocardiography might improve outcomes of ASA.

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