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Case Report

Gelatin lights-agitated gelatin as an echocardiographic contrast agent for alcohol septal ablation

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ABSTRACT

A good contrast echocardiographic study enhances the safety and efficacy of alcohol ablation procedures. Newer generation echocardiographic contrast agents and conventional radiographic contrast agents when used as echocardiographic contrast agents for this purpose are often unsatisfactory. We describe the use of agitated modified gelatin, a cheap and readily available agent that provides excellent echocardiographic images and identifies the myocardium supplied by the targeted septal artery.

A good contrast echocardiographic study enhances the safety and efficacy of alcohol ablation procedures. The echocardiographic contrast agent when injected into the target artery can reliably identify the myocardium supplied by the artery. First generation echo contrast agents like levovist® were good agents in this regard. These are however no longer available. Newer generation echocardiographic contrast agents or conventional radiographic contrast agents used as echocardiographic contrast agents are very often unsatisfactory. We describe the use of agitated modified gelatin, a cheap and readily available agent that provides excellent echocardiographic images.

A 60-year-old male complained of mild exertional breathlessness since the age of 15–20 years. His symptoms had increased for the past 10 years and presently he had breathlessness, chest heaviness, palpitations, and fatigue on walking 100 m on level ground. His ECG showed left ventricular hypertrophy with strain pattern. Echocardiography showed asymmetrical septal hypertrophy with maximal left ventricular wall thickness of 25 mm, complete systolic anterior motion of mitral valve with moderate mitral regurgitation, and resting left ventricular outflow tract gradient of 113 mm. He first presented to us 4 years back and was started on metoprolol and disopyramide. He had marked symptomatic improvement and increased his walking distance to over 2 km. On stopping disopyramide, he once again developed severe symptoms and was now taken up for alcohol septal ablation.

Coronary angiography showed a plaque in the left anterior descending artery and its diagonal branch. ATW guidewire® (Cordis) was passed into the first large septal branch of the left anterior coronary artery. A 1.5 mm × 10 mm Sprinter® over-the-wire semicompliant balloon (Medtronic) was passed over

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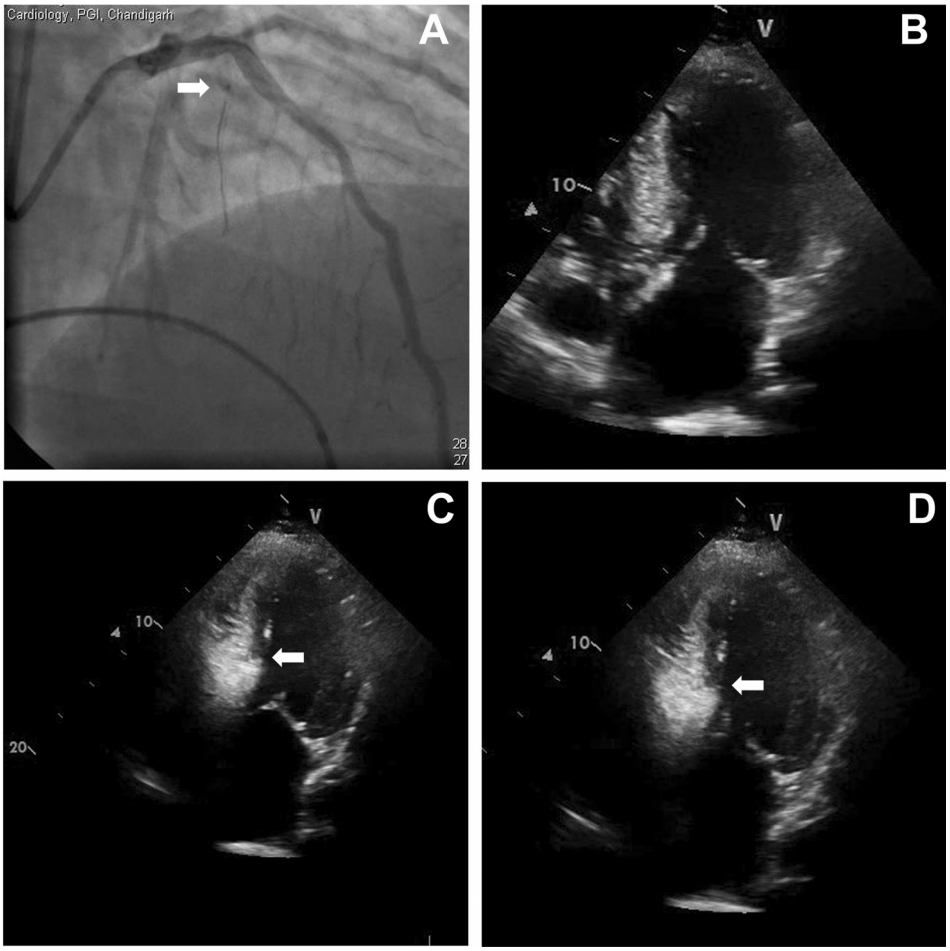

Fig. 1 – (A) Coronary guidewire and central marker of over the wire balloon (arrow) seen in the first septal branch that was ablated. (B) Apical four chamber view showing the interventricular septum prior to injection of agitated gelatin. (C and D) Apical four chamber view following injection of agitated gelatin through the central lumen of the coronary balloon. Bright gelatin depot in the basal interventricular septum is clearly seen (arrows). The depot extends across the septal-mitral contact point.

the wire and the proximal edge of the balloon was positioned just distal to the septal osteum (Fig. 1A). The balloon was inflated to 7 atm pressure. Radiographic contrast injection into the left coronary artery showed no leakage of contrast into the septal branch across the balloon.

Agitated gelofusine® (B Braun Medical, India) was used as an echocardiographic contrast agent. Gelofusine contains 4% modified liquid gelatin. Two 5 ml luer lock syringes were connected across a 3-way stopcock. 5 ml gelofusine was taken in one syringe and 1 ml gelofusine along with 2 ml air in the other syringe. The gelofusine–air mixture was vigorously agitated between the syringes across the 3-way stopcock. The gelofusine–air mixture formed a milky fluid with no visible air bubbles. 2–3 ml of this fluid was now injected into the central lumen of the over-the-wire balloon. On echocardiography, an excellent contrast depot was seen in basal septum well beyond septal mitral contact point (Fig. 1C and D) as compared to the baseline (Fig. 1B). Thus, the myocardium supplied by the target septal artery was well delineated. 2.2 ml absolute alcohol was now slowly injected into the central lumen of the over-the-wire balloon. Post-procedure, the target septal branch had no residual flow. Resting gradient across the left ventricular outflow tract dropped from 92 to 30 mmHg.

It is important to identify the extent of myocardium being supplied by the target septal artery since alcohol will cause myocardial necrosis in the septal territory. By far, the most reliable investigation is contrast echocardiography with the contrast agent being injected into the septal through the central lumen of the balloon. A reliable contrast echocardiography will not only confirm that the target myocardium (across the septal-mitral contact point in a typical left ventricular outflow tract obstruction) is being adequately supplied by the septal but will also identify areas of myocardium areas of anomalous supply like right ventricular free wall and papillary muscles. Confirmation of the myocardium supplied by the targeted artery increases the safety and efficacy of all alcohol ablation procedures. The importance of identifying the affected myocardium is even more when atypical regions like left ventricular mid-cavity or right ventricular muscle bands are targeted for ablation.

Various echocardiographic contrast agents have been tried. The usual radiographic contrast agents are often used instead

of echocardiographic contrast agents to identify the area of the myocardium perfused by the septal branch. Echocardiographic visualization with radiographic contrast agents is sub-optimal and the contrast depot in the myocardium is not very echogenic. This is exemplified by the fact that the echogenicity of these agents is far less than the alcohol that is subsequently injected. Areas of anomalous supply like the papillary muscle and right ventricular free wall that have a lower contrast density may not get highlighted with radiographic contrast agents. However, radiographic contrast agents are often well visualized in areas with high contrast density like the septum.

Various echocardiographic contrast agents have also been tried for this procedure. First, generation echocardiographic contrast agents like levovist® (Schering, Berlin, Germany) were good contrast agents for this purpose.[1] First generation echocardiographic contrast agents, however, are no longer available in many countries. Newer generation echo contrast agents are now widely available. These unfortunately are not very suitable for the procedure. Unlike the first generation agents, the second generation echo contrast agents pass more efficiently through the capillary bed and are thus preferred agents for intravenous contrast echocardiography.[3] This very property that makes them good agents for use as intravenous contrast, make them less suitable as contrast echo agents in myocardial contrast echocardiography. Since they rapidly pass through the capillary bed, they do not form a good depot in the myocardium, instead they rapidly get washed out of the myocardium into the ventricular cavity.[2]

Modified gelatin is widely available as a volume expander and cold agitated has been used an echocardiographic contrast agent.[4] As seen in Fig. 1C and 1D, agitated modified gelatin (gelofusine®) forms an excellent depot in the myocardium and hence provides excellent echocardiographic contrast. This depot was as echogenic as that subsequently formed by alcohol. We had used agitated gelofusine® stored at room temperature. It is cheap, beautifully lights up the myocardium, and is probably the best echocardiographic contrast agent for alcohol ablation procedures available today.

To conclude, agitated gelatin forms a very echogenic depot in the myocardium. Hence, agitated gelatin is excellent and probably the best echocardiographic contrast agent available today for identifying myocardium supplied by the septal artery prior to alcohol septal ablation.

Conflicts of interest

The authors have none to declare.

REFERENCES

1. Faber L, Seggewiss H, Welge D, et al. Echo-guided percutaneous septal ablation for symptomatic hypertrophic obstructive cardiomyopathy: 7 years of experience. *Eur J Echocardiogr*. 2004;5:347–355.
2. Bahl A. Alcohol septal ablation – an evolving procedure. *Indian Heart J*. 2012;64:591–593.
3. Dijkmans PA, Senior R, Becher H, et al. Myocardial contrast echocardiography evolving as a clinically feasible technique for accurate, rapid, and safe assessment of myocardial perfusion: the evidence so far. *J Am Coll Cardiol*. 2006;48:2168–2177.
4. Pfeiffer B, Rigopoulos A, Seggewiß H. Myocardial contrast echocardiography guided alcohol septal ablation in hypertrophic obstructive cardiomyopathy with a new echocardiographic contrast agent. *Dtsch Med Wochenschr*. 2012;137:2093–2096.