Alcohol Ablation of Right Ventricular Outflow Tract Obstruction

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A 28-year-old woman with valvular and infundibular pulmonary narrowing (peak Doppler gradients of 120 mm Hg) had presented to us in the last trimester of pregnancy. She had an uneventful delivery, and subsequently, she underwent elective pulmonary valve balloon dilation (Figs. 1A and 1B). Following the valvuloplasty, the right ventricular (RV) pressures rose markedly despite adequate dilation of the pulmonary valve, and the gradients across the valve and at the infundibulum level were 30 and 100 mm Hg, respectively. She remained stable and was started on oral metoprolol (sustained release) 50 mg twice daily. Repeat echocardiogram following 6 months of therapy with metoprolol...
showed persistent right ventricular outflow track (RVOT) gradients (150 mm Hg) at the infundibular level. The pulmonary valve was opening well, with mild pulmonary regurgitation. A computed tomography coronary angiogram delineated the anomalous infundibular bundle with a large conal artery supply. Following a detailed conversation and providing informed consent, percutaneous alcohol ablation of the conal artery was planned in view of her reluctance for open heart surgery.

The RV pressure was systemic, with a gradient of 90 mm Hg across the infundibulum (Fig. 2). A simultaneous RV and conal artery angiogram clearly delineated the conal artery supply to the large, anomalous infundibular muscle bundle (Online Video 1). A temporary transvenous pacemaker lead was inserted. The conal artery had a separate origin from the right coronary artery (Fig. 1C), and selective engagement of the conal artery was done with difficulty. A 0.014-inch exchange length BMW guidewire (Abbott Laboratories, Abbott Park, Illinois) was placed distally in the conal artery. A 2.5 × 12-mm over-the-wire Fire Star balloon (Cordis Corporation–Asian Pacific, Singapore) was inflated in the conal artery. Following guidewire removal, 1 ml of contrast was injected distally (Fig. 1D). This showed marked staining of the infundibular muscle on fluoroscopy (Online Video 2), which was confirmed by echocardiography. Sustained balloon inflation (10 min) demonstrated clear reduction in gradients across the RVOT. On confirming assured target and success, both radiographically and hemodynamically, 1 ml of absolute alcohol was injected distally into the conal artery through the lumen of the inflated balloon catheter. The patient complained of mild chest pain. Ten minutes later, the balloon was flushed and then deflated. The suprasystemic RV pressures dropped dramatically, with significant reductions of the RVOT gradients from 90 mm Hg pre-procedure to 40 mm Hg (Fig. 2). The creatine kinase-myocardial band isoform increased progressively over the next 12 h and peaked at 546 IU/ml. The patient had an uneventful intensive care unit stay and was electively discharged on day 3. On follow-up at 3 months, the patient was well, and the routine echocardiogram showed further reduction in gradients to 30 mm Hg across the RVOT.

Brock (1), in his historic paper in 1948, first described closed RVOT dilation that paved the way for several intracardiac corrective surgeries. Open heart surgery is currently the established treatment for muscular RVOT obstruction. Several percutaneous palliative procedures have been tried with limited success for relieving RVOT obstruction. Balloon dilation, cutting balloons, stents, and even atherectomy have been used in the past (2,3). Alcohol ablation for hypertrophic cardiomyopathy is now an established procedure (4). Procedural complications of septal alcohol ablation, including dissection, alcohol spillage, dreaded complications of complete heart block, and cardiac perforations, are likely to be lower in alcohol ablation of RVOT as compared with the left side. The long-term risk of ventricular arrhythmias as a result of scarring is a remote, albeit real, risk. The lack of mid- to long-term data on the safety and efficacy of this procedure is a major limitation.
Alcohol ablation for RVOT obstruction is novel, and may prove to be an elegant cure for RVOT obstruction in selected patients.

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REFERENCES


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