CONTRAST ECHOCARDIOGRAPHY

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Contrast echocardiography is the technique of injecting an echo-producing biologically compatible solution (e.g. dextrose 5% in water, saline, indocyanine green dye) into the blood stream and, using M-mode and two-dimensional techniques, observing the blood flow patterns as revealed by the resulting cloud of echoes. The method makes it possible to derive information that was heretofore available only from cardiac catheterization and angiocardiography. Echo contrast has proved valuable in the identification of various cardiac structural abnormalities and validation of cross-sectional views. The method is extremely sensitive for the detection (and exclusion) of intracardiac right-to-left shunts (specificity for shunt detection borders on 100% and shunts as small as 5% are demonstrated) and the demonstration of abnormal flow patterns in the presence of complex congenital heart disease. Peripheral venous contrast injections are useful in diagnosing pulmonary hypertension and insufficiency. Subcostal inferior vena cava contrast echo is a specific and sensitive technique for diagnosing tricuspid valve regurgitation. Study of the functional integrety of left-sided heart valves requires cardiac catheterization and regurgitant volumes as small as 10% of forward flow can be detected. Recently, the possibility of left ventricular opacification and direct demonstration of left-to-right shunts via pulmonary wedge injections of echo contrast has been demonstrated, avoiding invasion of the left heart. Videodensitometric techniques are now being used to explore the possibility of quantitation of shunts and ejection fraction using calibrated microbubbles for reproducible echo contrast. Future possibilities for contrast echocardiography include: 1) transmission of "mini-microbubbles" through the lungs after peripheral venous injection; 2) imaging of myocardial blood flow using "mini-microbubbles"; 3) analysis of flow patterns and velocities using 2-D and M-mode techniques; 4) combined CE-Doppler studies, and 5) the far-fetched goal of pressure measurements using microbubbles resonant frequency analysis.