INTRODUCTION: Successful surgical mitral valve repair (mitral valvuloplasty) must avoid persistent mitral regurgitation (MR), creation of mitral stenosis, or production of left ventricular outflow tract obstruction (LVOT). Previous methods for intraoperative evaluation (auscultation, palpation, hemodynamic monitoring, insufflation of the flaccid heart, presence or absence of V waves) are inaccurate and require additional operative time. The evolution of transesophageal echocardiography (TEE), 2-D, and Doppler color flow mapping allows immediate intraoperative assessment of mitral valve orifice area and LVOT dimensions before and after surgical repair. Further repairs can be made immediately to correct persistent defects in mitral valve function or a repair can be abandoned and the mitral valve replaced. We evaluated patients undergoing mitral valvuloplasty by using TEE intraoperatively and compared the results to observations obtained by conventional chest wall echocardiography (CWE) two to six weeks postoperatively.

METHODS: After approval of the Human Investigation Committee, eight patients for Carpentier mitral valvuloplasty gave informed consent for intraoperative TEE. After induction of anesthesia and endotracheal intubation, a Hewlett-Packard (HP) 5MHz 9mm transesophageal probe was inserted into the esophagus and connected to a HP 77020A ultrasound system. The left atrium (LA), left ventricle (LV), mitral valve (MV), LVOT, and aortic root (AR) were imaged intraoperatively. Color flow mapping of the mitral orifice, LA and LVOT were performed also. All studies were recorded on a Sony 3/4" video. All patients were studied two to six weeks postoperatively by CWE and color-flow mapping with an HP 7751A. CWE measurements are not available intraoperatively and results are presented for the postoperative period only. Independent observers determined the mitral valve abnormality, degree of MR and LVOT dimensions for both TEE and CWE. Mitral valve abnormalities were defined by the leaflet involved [anterior mitral leaflet (AML) or posterior mitral leaflet (PML)], and whether it prolapsed (P) or flailed (F). The degree of MR was estimated by measuring the width and depth of the jet occupying the visible LA. LVOT dimensions (millimeters) were measured at 2 cm proximal and parallel to the aortic root from the base of the AML to the intraventricular septum (IVS). Two measurements of the LVOT were obtained by averaging dimensions in multiple frames; one from the trailing edge of the AML base to the IVS, the second from the leading edge. The presence or absence of anterior leaflet systolic anterior motion (SAM) was noted from either view. A comparison of TEE and CWE color flow patterns then were made to evaluate the performance of TEE in evaluating the immediate results of mitral valvuloplasty.

RESULTS:

BEFORE REPAIR TEE

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AFTER REPAIR TEE

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CONCLUSION: 1) TEE with Doppler color flow mapping is a reliable and accurate method for assessing mitral valve repair. 2) The intraoperative assessment of mitral regurgitation after mitral valvuloplasty using TEE was identical to that using CWE. Mild to severe MR can be assessed very accurately, although the LA cannot be completely visualized due to the proximity of the probe to the chamber. 3) Although slight turbulence across the LVOT was noted on color flow, the absence of SAM precluded hemodynamic significance.

By obtaining skill in transesophageal echocardiography, the anesthesiologist has the opportunity to apply new knowledge and techniques for immediate benefit to the patient and to expand his consultative role. Immediate assessment of mitral valvuloplasty can be added to detection of intraoperative ischemia and estimation of chamber volume that are now available from the intraoperative use and interpretation of TEE.