

In addition, the inotropic effects of medications, and the wall-motion abnormalities resulting from myocardial ischemia can be determined by direct observation of the left ventricular images. TEE observation of the left ventricle, electrocardiographic monitoring of cardiac rhythm, arterial blood pressure monitoring, and Swan-Ganz catheter monitoring of pulmonary arterial pressure and cardiac output are complimentary measures that provide a sophisticated continuous hemodynamic appraisal.

Intraoperative echocardiography has been applied extensively to cardiac surgery, particularly in patients undergoing nonprosthetic valve surgery. We have used epicardial echocardiography and TEE during valve repair for every known valvular abnormality, many types of congenital heart surgery, myectomy for hypertrophic cardiomyopathy, and repair of periprosthetic regurgitation. In addition, intraoperative TEE is useful when difficulty is encountered in weaning the patient from cardiopulmonary bypass.

In patients undergoing valve repair for mitral or aortic regurgitation, the "pre-pump" intraoperative TEE is extremely useful in "designing" the surgery itself. The operative team must understand the *mechanism* of valvular dysfunction to enable a successful repair. This appraisal includes two-dimensional echocardiographic structural evaluation of leaflet motion, and color-flow imaging evaluation of the origin and direction of the regurgitant jet. Often, intraoperative echocardiography can improve the understanding of the mechanism obtained by preoperative transthoracic imaging.

After valve repair and weaning from the cardiopulmonary bypass machine, intraoperative TEE is performed to identify patients with suboptimal results or failed valve repair. Of 1484 patients having "post-pump" TEE after valve repair for mitral regurgitation from 1987 to 1992, 105 (7.1%) underwent further surgery during the same thoracotomy after echocardiographic determination of the presence and mechanism of persistent problems. Of these, about 70% underwent further repair, and the remainder underwent prosthetic valve replacement; all left the operating room with successful valvular surgery.

#### TEE IN THE INTENSIVE CARE UNIT

TEE is very safe, even in critically ill patients, if certain precautions are taken. In particular, patients with tenuous cardiopulmonary stability should be intubated before the TEE study is started. TEE is

particularly useful in evaluating ventilator patients or those in whom TTE offers suboptimal visualization of the anatomy. TEE can determine the reason for hypotension by determining the presence of pericardial effusion, tamponade, ventricular dysfunction, or acute valvular abnormalities. The images of the cardiac chambers and valves are often useful in determining the cause of pulmonary edema. TEE can be useful in the evaluation of patients with chest pain, particularly to determine the presence of a thoracic aortic dissection. No other procedure can reliably make this diagnosis as quickly, thus avoiding delays which can cost patients' lives. TEE can diagnose the presence and location of intimal flaps and tears, aortic insufficiency, hemopericardium, and the involvement of the coronary ostia in the dissection.

#### CONCLUSION

TEE provides a dramatic and useful method of cardiac imaging, which adds immeasurably to diagnosis in selected patients evaluated in the echocardiography laboratory. Intraoperative TEE provides a "safety net" for detection of failed valve repair that allows further surgery to be performed during the same thoracotomy. In the intensive care unit, TEE is useful in critically ill patients to enable rapid diagnosis and appropriate management.

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#### MENOPAUSE: MANAGING THE ASSOCIATED RISKS

**M**enopause is an excellent time to reassess a female patient's health habits and the need for health maintenance measures.

The onset of menopause usually occurs between ages 40 and 55 (the average age of onset in the United States is 51.5), and it is associated with various physical changes. Medically, menopause can be considered as a potential adult-onset primary hypogonadism that causes estrogen deficiency and relative androgen excess. The altered hormonal levels result in changes in the skin, hair, and voice, as well as in the urogenital, musculoskeletal, and cardiovascular systems. Neuropsychiatric changes can also be seen.

The degree to which these changes are present varies among individuals, depending on genetic and constitutional factors and non-ovarian production of estrogen. Estrogen replacement therapy (given in conjunction with progestin to women who have a uterus) reduces many of the serious effects of menopause.

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#### ASSESSMENT

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The clinical assessment of menopausal women should include a focused history and physical. The focused history should include questions about common menopausal symptoms such as hot flashes, sleep disturbances, urinary frequency, urgency, and incontinence. It's important to ask pointed questions about specific changes that may have occurred in sexual function, skin, hair, and level of concentration, because the patient is unlikely to offer this information otherwise. Physicians should also inquire about the patient's habits, including alcohol, drug, and nicotine use; diet, especially calcium, fat, and caffeine intake; and exercise or physical activity. In addition, osteoporotic risk factors should be assessed.

The physical examination should include measurements of height, weight, and blood pressure and should take into consideration the skin, heart, thyroid, and pelvic region. In the pelvic exam, the physician should look for signs of estrogen deficiency and pelvic prolapse or relaxation. A breast exam should also be performed, along with an explanation of the method for performing self-examination. Screening mammography should be conducted every year for female patients over age 50, and at least every other year between ages 40 and 50. Endocervical and ectocervical sampling is also recommended for menopausal and postmenopausal women. Bone densitometry is helpful in selected patients. In addition, lipid levels should be measured.

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#### ESTROGEN REPLACEMENT THERAPY

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Many of the adverse effects associated with menopause can be controlled by estrogen replacement therapy. Currently, the European regimen is favored. By this method, continuous estrogen is administered daily, and cycled progestin is given on days 1 through 12 of the calendar month. The continuous combination of estrogen and progestin is not universally recommended at this time because not enough data are available. It has been suggested that such a regimen is advantageous because it induces endometrial atrophy and subsequent amenorrhea.

Recent guidelines from the American College of Physicians (ACP) assert that estrogen replacement therapy offers significant benefits in reducing the risk of cardiovascular disease and osteoporotic hip fractures in menopausal women. According to the ACP-collated data, a 50-year-old white woman has a 46% probability of developing cardiovascular disease, and a 31% probability of dying from it. A compilation of data from studies since 1970 shows that estrogen therapy is associated with a cardiovascular risk reduction of 0.65; for combination therapy, the risk reduction is 0.65 to 0.8. (Data were not available for nonwhite patients, but the ACP says the risk reduction data can be generalized to apply to women of all races.)

Older white women have a 10% lifetime chance of developing breast cancer and a 3% chance of dying from it; the relative risk among estrogen users is, at the highest estimate, 1.25. However, the Boston Nurse Health Study, which compared women who had never used estrogen with those who had used it, found no association between estrogen use and breast cancer. Estrogen is not a carcinogen, but it is a trophic hormone, and so it may promote the growth of an existing tumor. Thus, replacement therapy should not be used for women who have a history of breast cancer, but benign breast disease is not a contraindication.

Endometrial cancer is less common in older women, developing in 2.6% of white women over age 50. Estrogen therapy alone significantly increases the risk by as much as 10-fold. Using progestin in combination with estrogen reduces the relative risk to 1.0 or less.

Osteoporotic hip fractures pose a serious risk to older women, accounting for 15% of deaths. The median age of first fracture is 79. Estimates on risk reduction using estrogen replacement therapy vary, ranging from 0.5 to 0.75.

Women over age 50 have a 20% lifetime chance of developing a stroke, and an 8% chance of dying from it. The median age of death from stroke in women is 83. The ACP review indicated that estrogen does not affect this risk, but a recent study in the *Archives of Internal Medicine* shows that estrogen reduces the risk of stroke. The ACP has concluded that hormone replacement therapy is recommended for women who have had a hysterectomy or who have or are at high risk for coronary heart disease. Such therapy can increase life expectancy by 1 to 2 years, which is similar to the gain for treating patients with mild to moderate hypertension. Many more women can benefit from hormone replacement therapy due to quality of life improvements. Individual medical assessment, education, and health maintenance measures should be offered to all menopausal women.

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