Transthoracic Echocardiography In The Outpatient Surgery Setting

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Citation

A Hadzic, J Vloka, R Koorn, H Shih, L Brusco, Z Hillel, D Thys. *Transthoracic Echocardiography In The Outpatient Surgery Setting*. The Internet Journal of Anesthesiology. 1998 Volume 3 Number 2.

Abstract

Purpose The trend toward minimal preoperative testing frequently results in patients presenting for ambulatory surgery with inadequate cardiac evaluation. In such a setting, anesthesiologists are often faced with day-of-surgery dilemmas regarding weather the risk of a patient for surgery and anesthesia have been fully minimized, or whether a patient's postoperative condition is adequate for safe discharge home. Recent practice guidelines suggest that a TTE exam is often sufficient to exclude major cardiac pathology in patients scheduled to undergo procedures with low cardiac risk. Clinical Features We report on three patients scheduled for ambulatory surgery, who presented on the day of surgery with inadequately investigated medical problems. A transthoracic echocardiography examination (TTE) performed by anesthesiologists trained and experienced in the use of TTE significantly facilitated the patients' perioperative management in a time-efficient manner. Conclusion In the absence of timely cardiology-echocardiography consultation, a targeted, basic transthoracic echocardiography examination by anesthesiologists can be used to quickly exclude major cardiac pathology and guide perioperative care.

ABBREVIATIONS

- ECHO –echocardiography
- TTE -transthoracic echocardiography
- LVH - left ventricular hypertrophy
- LVEF - left ventricular ejection fraction
- TURBT -transurethral bladder tumor resection
- PACU -post-anesthesia care unit
- ACC/AHA -American College of Cardiology/ American Heart Association
- LA - left atrium
- LV - left ventricle
- RV - right ventricle

INTRODUCTION

Recent changes in medicine have led to a greater emphasis on ambulatory care, with a steady increase in the proportion of elderly patients and patients with coexisting medical diseases operated on in an ambulatory setting. The trend toward minimal preoperative testing frequently results in patients presenting for surgery with insufficient quantitative information. In such a setting, anesthesiologists are often faced with day-of-surgery dilemmas regarding weather the risk of a patient for surgery and anesthesia have been fully minimized, or whether a patient’s postoperative condition is adequate for safe discharge home. We report on three patients, scheduled for ambulatory surgery, who presented on the of surgery with inadequately investigated medical problems. A basic transthoracic echocardiography examination (TTE) performed by anesthesiologists trained and experienced in the use of TTE significantly facilitated the patients’ perioperative management in a time-efficient manner.

PATIENT #1

A 72 year old woman presented for outpatient arthroscopy of her right knee. She denied any history of cardiovascular or pulmonary disease, but reported getting quickly tired when climbing stairs. She was not taking any medications. Auscultation of the heart revealed a harsh (Grade 2/6) systolic murmur, which raised a suspicion that her symptoms could be due to an underlying aortic stenosis. Laboratory examinations were normal, but her ECG showed repolarization abnormalities (leads V3-V6), a left anterior hemiblock and left ventricular hypertrophy (LVH). Rather than postponing surgery for additional testing, the

anesthesiologist performed a TTE examination in the holding area. It revealed severe aortic calcification (Figure 1), but the preserved mobility of aortic leaflets and Doppler examination excluded significant aortic stenosis (Figure 2). LV function was normal with a LV ejection fraction (LVEF) of 50%. In the setting of normal chest examination, and normal TTE findings, her symptoms were attributed to de-conditioning as a result of the increasing pain in her knees and her inability to exercise. The operation proceeded under spinal anesthesia and her perioperative course was uneventful.

Figure 1

Figure 1. Apical four-chamber two-dimensional echocardiogram demonstrates thickened, calcific and poorly mobile aortic valve. Legend: LA- Left atrium, LV- Left ventricle, Arrow- Aortic valve

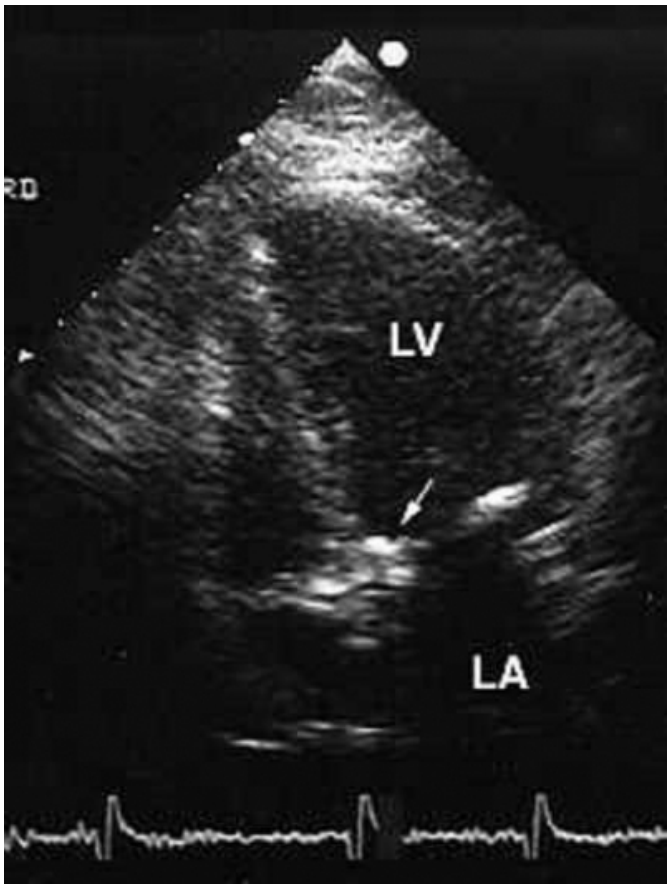
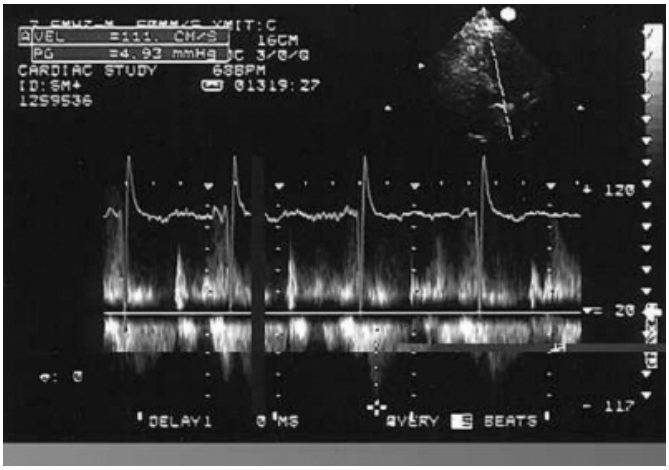


Figure 2

Figure 2. Continuous wave Doppler recording of the ascending aorta demonstrates normal peak velocity



PATIENT #2

A 65 year old male smoker with a history of arterial hypertension was scheduled for transurethral bladder tumor resection (TURBT). The patient denied any history of lung or heart disease, but reported increasing shortness of breath during mild exercise. His arterial blood pressure was 170/98 mmHg and heart rate was 90 bpm. Auscultation of the chest revealed bilateral rhonchi. The chest radiograph demonstrated blunting of the left costo-phrenic angle, suggestive of a small pleural effusion. There was no jugular venous distention or third heart sound. His ECG was consistent with LVH, with occasional premature ventricular contractions and a right bundle branch block. Because the unexplained dyspnea on exertion, abnormal chest examination and pleural effusion could be due to congestive heart failure, a TTE was performed in the holding area. The examination demonstrated mild LVH with an LVEF of 65% and normal regional wall motion. After significant ventricular and valvular dysfunction were excluded, the surgery proceeded uneventfully under spinal anesthesia. Following his recovery in the post-anesthesia care unit (PACU), the patient was discharged home and advised to consult his primary care physician.

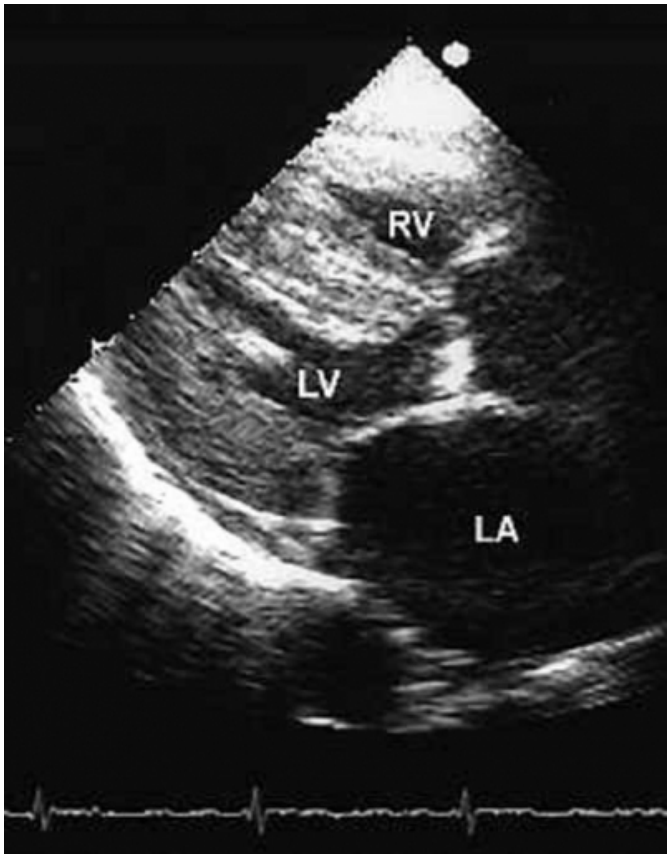
PATIENT #3

A 75 year old man was scheduled for TURBT. He suffered from arterial hypertension and was treated with 25 mg hydrochlorothiazide once a day. His preoperative blood pressure was 175/95 mmHg. Although his ECG demonstrated LVH and Q-waves in leads V1-V4, suggestive of an old anterior wall infarct, the patient reported good exercise tolerance and denied having had any “heart

problems" in the past. The introduction of spinal anesthesia (75 mg of hyperbaric lidocaine in the sitting position) resulted in hypotension (70/30 mmHg) requiring frequent boluses of ephedrine and phenylephrine. Five hundred ml of lactated Ringer solution were infused during the short surgical procedure (18 minutes). Although the operation ended uneventfully, he required additional doses of vasopressors in the PACU because of recurring hypotension (80/60 mmHg). He reported no chest pain and his ECG remained unchanged. At this time, a TTE was performed revealing abnormally small left ventricular end-diastolic cavity with normal regional wall motion, and LVH with prominent hypertrophy of the interventricular septum (Figure 3). Absence of cardiac history and the TTE findings suggested that his ECG abnormalities were most likely caused by septal hypertrophy simulating previous anterior myocardial infarction. A bolus of 750 ml of isotonic saline promptly corrected his hypotension. Hydrochlorothiazide was discontinued, his internist was informed, and the patient was uneventfully discharged home.

Figure 3

Figure 3. Parasternal long axis two-dimensional echocardiogram demonstrates marked hypertrophy of the left ventricle with small left ventricular cavity: Legend: LA- Left atrium, LV- Left ventricle, RV- Right ventricle



DISCUSSION

The current era of cost containment and rational use of testing occasionally lead to inadequate preoperative assessment that could result in greater morbidity and higher cost in some patients. Unfortunately, many patients are unable to give reliable exercise history due to advanced age or the underlying musculo-skeletal pathology.,, Although these problems could decidedly be elucidated by medical consultations, with or without additional testing, this often results in postponement and/or disruption of the planned surgical procedure until the results become available.

Recent practice guidelines suggest that a TTE exam is often sufficient to exclude major cardiac pathology in patients scheduled to undergo procedures with low cardiac risk, The ACC/AHA guidelines for the clinical application of echocardiography indicate that in patients with a murmur and ambiguous clinical findings, echocardiography is the preferred diagnostic test because it can provide a definitive diagnosis. In patients with dyspnea, echocardiography is the preferred initial diagnostic test when the history, physical examination and routine laboratory tests cannot eliminate cardiac disease. Echocardiography allows one to confirm or rule out the major cardiac causes of dyspnea such as LVH, valvular disease, diastolic dysfunction and cardiomyopathy, all of which represent major clinical predictors of cardiac risk., Finally, hemodynamic instability with hypotension is a category 1 indication ("strongest evidence; echocardiography is frequently useful") for both TTE and transesophageal echocardiography.

It has been strongly suggested that anesthesiologists should manage all aspects of a patient's perioperative care., Anesthesiologists are increasingly assuming the role of cardiac diagnosticians in many centers and use transeosophageal echocardiography (TEE) intraoperatively to determine ventricular function, hemodynamics, regional wall motion and valvular abnormalities and to asses the extent of aortic dissection and adequacy of valve repair., In contrast, TTE is non-invasive and can easily be obtained perioperatively in a time-efficient manner (10-15 minutes) and with minimal patient discomfort by anesthesiologists trained in TTE. While the information obtained by ECHO may not be sufficiently predictive in high-risk noncardiac surgery, it can help resolve common problems in low-risk surgery frequently performed on an outpatient basis. In the presented three clinical scenarios, the perioperative use of ECHO by anesthesiologists greatly facilitated patient care. The information obtained by ECHO prevented unnecessary

delay of surgery and additional testing in the first two patients, and unnecessary hospitalization, the use of invasive monitoring and extensive cardiac work-up in the last patient.

The utility of echocardiography is not new to anesthesiologists. Sophisticated echocardiographic equipment and TEE are already available and have become indispensable in many operating rooms. Although a detailed TTE examination is optimally performed in an ECHO laboratory under the supervision of a cardiologist-echocardiographer, such facilities and their services are often not immediately available in outpatient surgery setting. However, even physicians with limited training in TTE can significantly improve the cardiac assessment. Guidelines for optimal physician training in TTE recommend that a physician needs 6 months of training (including 300 2D/M-mode and 225 Doppler examinations) to take independent responsibility for echocardiographic studies. With such a training, a targeted examination (e.g., to assess the ejection fraction, valvular function, wall motion) by an anesthesiologist can yield information of significant importance for safer perioperative management of anesthetics. However, in order to assure such a role, competence on the part of the anesthesiologist is essential, as well as collaboration with cardiologists, surgeons, and primary care physicians.

While routine ECHO evaluation is ideally performed in dedicated ECHO laboratories, a targeted, basic TTE examination performed by anesthesiologists trained in ECHO may greatly facilitate patient care where the cardiology-echocardiography consultation is not immediately available. Miniaturization, greater portability, and decrease in the cost of the TTE equipment, as well as echocardiography telemedicine via a lap-top computer to provide 24-hour consultation with an echocardiographer, all hold promise that TTE may soon become an extension of the routine physical examination., For anesthesiologists to become effective as perioperative physicians, their training in the near future may need to be adjusted to also include formal instruction in TTE.

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