

LESS IS MORE

Preoperative Stress Tests—Superfluous Investigations Resulting in Excessive Treatment Delay

A Teachable Moment

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Story From the Front Lines

A man in his 70s was admitted with a right hip fracture following a mechanical fall. His medical history included controlled hypertension. Findings of cardiovascular examination were unremarkable, and peripheral examination revealed an externally rotated and shortened right leg with no vascular compromise. His electrocardiogram was normal. Prior to his fall, he was able to walk 2 to 3 miles a day, walk up several flights of stairs, and conduct moderate-intensity activities (such as golfing) without compromise. He gave no history of symptoms attributable to cardiovascular disease. The orthopedic team recommended an open reduction and internal fixation of his right hip.

Prior to surgery, he underwent a nuclear perfusion stress test for risk stratification. This was delayed for several days due to lack of availability of radioactive tracer. Results demonstrated a mild perfusion defect within the anterior and inferior wall, but the defect appearance raised the possibility of artifact. Subsequently, he underwent a dobutamine stress echocardiogram, which showed normal left ventricular function with no wall motion abnormalities during the stress portion of the test. We were asked to consult on the conflicting stress test results and determine the need for a coronary angiogram. After considering the patient's clinical history and reviewing the American Heart Association/American College of Cardiology (ACC/AHA) perioperative guidelines,¹ we suggested immediate surgery to repair the hip fracture without further investigations. His postoperative course was uncomplicated despite having his surgery delayed by 6 days.

Teachable Moment

Cardiovascular complications are the most frequent cause of death among patients undergoing elective noncardiac surgery.¹ Preoperative cardiovascular stress testing may identify high-risk patients to provide treatments to reduce postoperative major adverse cardiovascular events (MACEs). In patients who are relatively stable without a need for emergency surgery, a validated perioperative risk model should be considered.^{1,2} If MACE risk is less than 1%, preoperative stress testing is not required (class III; level of evidence, B). Our patient's perioperative MACE risk (0.2%; <http://www.riskcalculator.facs.org>)² supported no other investigations. With perioperative MACE risk above 1%, objective functional assessment

using a model such as the Duke Activity Status Index (DASI)¹ may be used. However, it is reasonable to forgo further stress testing in patients with metabolic equivalents (METs) greater than 10 (class IIa; level of evidence, B) or METs between 4 and 10 (class IIb; level of evidence, B). Even if our patient had a MACE risk above 1%, his DASI identified a METs of 7.99, supporting a conservative approach without subsequent tests.

With poor (METs, <4) or unknown functional capacity, it is reasonable to perform noninvasive pharmacologic stress tests only if the test will affect management (class IIb; level of evidence, C). For all patients, the trade-off in delaying surgery to conduct stress testing and potential coronary revascularization must be considered. Elective surgery may have to be further delayed in patients implanted with a bare metal stent (30 days) or drug-eluting stent (1 year) owing to increased harm risk (class III; level of evidence, B). In the case of hip fractures, early surgery (<24-72 hours) is associated with a significant reduction in risk of 1-year mortality (relative risk [RR], 0.55; 95% CI, 0.40-0.75), pneumonia (RR, 0.59; 95% CI, 0.37-0.93), and pressure-sore risk (RR, 0.48; 95% CI, 0.34-0.69).³ Furthermore, greater length of hospital stay and higher rate of subsequent comorbidity is seen with delayed hip fracture surgery.⁴

United States Medicare data for elective noncardiac and nonvascular surgery demonstrates a significant rise in preoperative stress testing (from 1.72% in 1996 to 6.44% in 2007) with an estimated 56 000 patients undergoing unnecessary stress test investigations.⁵ Such investigations can escalate into further unnecessary tests being performed. Approximately 0.6% to 2.9% of asymptomatic patients underwent coronary angiography following unnecessary preoperative stress testing, exposing patients to the periprocedural risk without any proven clinical benefit. In our patient, the initial pharmacologic stress test resulted in surgical delay, the need for subsequent testing, and additional assessment by our cardiology team.

Even if this patient had a positive finding on the stress test, given the significant benefit of early hip fracture repair, it is not clear if delaying this surgery to conduct coronary revascularization would result in net benefit. We want to emphasize herein that while we have the ability to conduct noninvasive and invasive cardiovascular tests, preoperative investigations must be used judiciously. A complete history, clinical risk

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stratification, and careful patient selection can identify the vast number of patients who do not require preoperative testing while still selecting the patients at excessive risk (ie, small subgroup) who may benefit from further investigations.

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