

CHAPTER

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Pre-Operative Cardio Pulmonary Assessment

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Introduction

Surgical interventions are continuously rising from 10% to 15% because of increasing number in surgical subspecialties providing operative management. At least one third of these cases belong to geriatric group who need mandatory pre-operative cardiopulmonary assessment¹. Mortality rate of 0.5-1% increases to 5% as the age advances, especially after 65 years of age. Cardiac reasons for morbidity and mortality are more within 48 hours of surgery while other causes such as pneumonia, sepsis, renal failure, pulmonary embolism & even cardiac arrest are responsible for death after 48 hours of surgery. Doctors are often asked to rule out high risk patients, not fit for surgery and also to help in stabilising & preparing for surgery with medication.

Expected cardiac risks

Incidence of post operative myocardial infarction in patients above 50 years is 0.5-1% and might escalate to 3% in those undergoing vascular surgery. These are of course, influenced by functional status of the patient, age, co-morbidities and post operative cardiac complications, if any. Emergency major surgical procedure for prolonged duration are considered high cardiac risk surgery while breast surgery, *cataract* surgery, superficial surgical and endoscopic procedures are considered low

cardiac risk². The advancement in anesthesia and perioperative surgical management has reduced the risk of mortality from 1 in 500 to 1 in 2,50,00 in the last 50 years. Monitoring in high risk patients for myocardial ischemia is required in post-operative period in patients with hypertension, coronary artery disease, left ventricular hypertrophy, diabetes mellitus³ and in those taking digitalis. Attending critical care physician should be vigilant as post operative myocardial infarctions are painless in more than 60% of cases⁴.

Cardio vascular assessment

History of recent ischemic heart disease is major risk factor, because the risk of perioperative & post operative myocardial ischemia will increase from 5% to 65% and to 35% if the past history of suffering from myocardial infarction is more than six months, less than six months or less than three months, respectively. Negative stress testing, however, can permit surgical procedure even after six weeks, under the expertised anesthetic peri & post operative care. If there is no contra-indication, treatment with beta blockers, few days prior to surgery, to bring down heart rate 60/minute, decreases the subsequent cardiac events in high risk patients.⁵

In those with aortic stenosis, having a fixed cardiac output, the risk of surgery is increased as

they can not tolerate vasodilation associated with spinal or general anesthesia. Those with preserved left ventricular functions⁶ such as patients with mitral or aortic regurgitation, are less likely to have cardiac events due to valve dysfunction. Patients with moderate to severe mitral stenosis are also high risk patients for surgery. Prophylaxis against infective endocarditis is mandatory in all these patients.

Patients with congestive heart failure are high risk patients to develop pulmonary edema. But those with no previous history of congestive heart failure, develop symptoms, may be in 5% of cases, within first hour, requiring urgent management with diuretics. These cases require on line fluids with caution, nodoubt; but at the sametime, dehydration should be avoided as it might lead to hypovolemic hypotension during anesthesia.

Patients with supraventricular arrhythmias are required to be rate-controlled before being subjected to surgery. Intra operative pacing may be required in patients with second or third degree block; patients with first degree block can tolerate surgery. Those with, ventricular arrhythmias need cardiologist's evaluation pre operatively.

Hypertension is another risk factor, pre-operative systolic and diastolic pressure of 180 mmHg & 110 mmHg can safely go for anesthesia & surgical procedure. Antihypertensive therapy has to be continued.

Functional status of the patient is a good predictor of patients risk for surgery. Clinical evaluation and consideration of risk factors do help in evaluation of the patients. Those with history of coronary angiography 2 years back and are clinically & functionally fit, can goahead with surgery, if other risk factors are not hindering.

Pulmonary assessment

This is required in chronic smokers⁷, patients with COPD and those with suspected lung disease, because 50% of overall mortality is expected to occur in those getting complicated with hypoventilation,

atelectasis and pneumonia, that occurs in almost one third of cases getting pulmonary complications.⁸ For surgical risk, forced expiratory volume in one second (FEV1) is the best indicator, where patients with FEV1 less than one are most prone to post operative pulmonary complications and those with FEV1 more than two can safely be operated upon. Chest X-ray for infection in COPD patients & those with tuberculosis is indicated. Patients with severe COPD might be subjected to arterial blood gas analysis.

Treatment of chest infection, cessation of smoking few weeks earlier and use of bronchodilators few days prior to surgery reduces pulmonary risks. Post-operative measures such as early mobilisation, with chest physiotherapy, bronchodilators, & incentive spirometry for patients of COPD is rewarding.

Pre-operative requirements, apart from routine tests,^{9,10} chest X-ray is recommended for every patient above 50 years of age and ECG¹¹ for any patient above 40 years, known diabetics and in those with known history of ischemic heart disease.

A proper history of A-for allergy, B-bleeding disorder, C-coronary artery disease/ corticoids being used/ COPD/ CHF, D-Drugs, (NSAIDs, Clopidogrel)/ diabetes, E-endocrinal status (Thyroid), F-family history of malignant hypertension/ (Fever), G- Glaucoma, H-HIV/ Hepatitis, I-infections including tuberculosis. This helps in better planning and pre-operative interaction among anesthetist, surgeon & the patient. High risk patients can get additional stress cardiac testing & even (though rare) angiography. Preoperative use of beta blockers in high risk patient with angina, positive TMT test, myocardial infarction, hypertension or coronary artery disease is useful in reducing post operative cardiac ischemic complication by 50%.

Comments

Constructive involvement of internist in taking well structured history, followed by focused clinical systematic examination to evolve efficacious evaluation of the patient before surgery, shall be

able to provide proper pre-operative information to the anesthetist to have interaction with the operating surgeon for proper peri & post operative care to avoid cardiopulmonary complications.¹²

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