ANESTHETIC CONSIDERATION IN CARDIAC PATIENTS UNDERGOING NONCARDIAC SURGERY

Husham Mohamed Abdallah Zakaria
Universitatea de Medicina și Farmacie “Carol Davilla”, Str. Dionisie Lupu nr. 37 Bucharest, Romania; Alshaab Teaching Hospital, Khartoum, Sudan
e-mail: hishca@gmail.com

Abstract: One of the biggest challenge today is the safe conduct of anesthesia for patients who might be elderly, have preexisting cardiac diseases and are scheduled to undergo noncardiac surgery. Within financial constraints of today health services. The appropriate investigations need to be decided and performed for these patients, in order to inform the anesthetist, surgeon and the patient of the risk of surgery. These should be undertaken only if they will influence management of the patient. The preoperative assessment will help with the formation of a perioperative management plan. Including preoperative optimization and postoperative care, in order to minimize the risk of an adverse outcome. The most recent guidelines for preoperative evaluation for noncardiac surgery are discussed in details, including assessment of risk factors, and cardiac investigation. Current thinking in preoperative therapy, intraoperative management and postoperative management is discussed, although most patients with cardiac disease have ischaemic heart disease, other specific cardiac conditions and the principles of their management are discussed.

Administration of anaesthesia to patients with preexisting cardiac diseases is one of interesting challenge. Most common cause of perioperative morbidity and mortality in cardiac patients is ischaemic heart diseases (IHD). IHD is number one cause of morbidity and mortality all over the world. Approximately 7 million are considered to be at high risk of IHD. Goldman et al. reported that 500,000 to 900,000 myocardial infarction occurs annually worldwide with subsequent mortality and mortal other cardiacity of 10-25%. Care of this patients require identification of risk factors, preoperative evaluation and optimization, medical therapy, monitoring and the choice of appropriate anesthetic technique and drugs.

Risk factors influencing perioperative cardiac mortality are: recent myocardial infarction; congestive heart failure; peripheral vascular diseases; angina pectoris; diabetes mellitus; hypercholesterolemia; dysrhythmias; age; renal dysfunction, obesity; life style and smoking.

Risk factors stratification.
In 1977 Goldman landmark cardiac risk index which was used extensively for preoperative risk assessment for the next two decades.

Other cardiac risk indices where proposed and adopted. In 1996 a 12-member task force of the American College of Cardiology and American Heart Association (ACC/AHA) published guidelines regarding the preoperative cardiovascular evaluation of patients undergoing noncardiac surgery.

In 2002 these guidelines were updated based on new data:

Evaluation:
Patient having any sort of cardiac ailment need to be evaluated properly preoperatively.

History:
Elicits the severity, progression and functional limitation introduced by cardiac disease. History should include:

1. Exercise tolerance: it depicts reserve, it can be excellent. History of participating in sports. Adequate patient able to climb stairs, run a short distance. Poor patient able to do leisure activities only e.g. slow ballroom dancing or can walk around in the house only.

2. Angina pectoris: it is symptomatic manifestation of myocardial ischaemia characterized by typical substernal pain which is provoked by physical exertion and relieved by rest or sublingual nitroglycerine.

3. Myocardial infarction: the incidence of MI during the perioperative period is related to time period since the previous MI.
4. Co-existing noncardiac diseases:
   a-peripheral vascular diseases
   b-cerebrovascular diseases
   c-chronic obstructive diseases
   d-renal dysfunction
   e-diabetes mellitus
   f-anaemia, polycythemia, thrombocytosis

5. Current medication, awareness about the medication that patient is taking is important during anaesthesia. All medication like Beta blockers calcium channel blockers, nitrates should be continued until the morning of surgery.

6. Congestive cardiac failure.

7. Dysrhythmias.

Examination:
A careful general physical examination should be done. It’s include assessment of vital signs like blood pressure, pulse rate, rhythm, jugular venous pulse, oedema, pallor, cyanosis, clubbing, jaundice, lymphadenopathy.

In systemic examination, cardiovascular system should be examined for heart sounds, any murmurs. Respiratory system also needs to be assessed in details.

Laboratory investigations:
Cardiac specific tests like ECG, Echocardiography, to know ejection fraction, any valvular lesions, wall motion abnormalities, LV function and pressure gradients. Holler monitoring, treadmill test, thallium scintigraphy to detect myocardium of risk, radionuclide ventriculography, dobutamine stress test (DST) for evaluating inducible ischemia in patients who have poor functional capacity.

Coronary angiography in patients where DST is positive should be done.

Anesthetic management:
Anesthesia goals remain
1-stable hemodynamics
2-prevent MI by optimizing myocardial oxygen supply and reducing oxygen demand
3-monitor for ischemia
4-treat ischemia or infarction if it develop
5-normothermia
6-avoidance of significant anaemia

Management depends upon the type of surgery whether emergency or elective. For emergency surgery proceed for the surgery with medical management of cardiac ailment. For elective surgery perioperative management depends upon, clinical risk factors and surgery specific risk factors.

Clinical risk factors:
Obtained by history, physical examination review echocardiography, risk factors are grouped into 3 categories:
1- major clinical predictors:
   - unstable coronary syndrome
   - decompressed heart failure
   - significant dysrrhythias
   and severe valvular diseases

2-Intermediate clinical predictors:
   - mild angina pectoris, previous MI by history or pathological Q waves, compensated or prior heart failure, insulin dependent diabetes mellitus and renal insufficiency

3-minor clinical predictors:
   - hypertension, left bundle branch block, nonspecific ST-T waves changes and history of stroke

Surgery specific risk:
1-High risk surgery: emergent major operation particularly in the elderly, aortic and other major vascular surgery. Anticipated prlon surgical procedures associated with large fluid shift or anticipated blood loss. Cardiac risk is > 5%.

2-intermediate risk factors: carotid endarterectomy, head and neck surgery, prostate surgery, intraperitoneal and intrathoracic surgery, cardiac risk is < 5%.

3-Low risk procedures: endoscopic procedures, superficial procedures, cataract surgeries, breast surgeries, cardiac risk is < 1%.

Preoperative management:
At risk patients need to be managed with pharmacological and other perioperative interventions that can ameliorate perioperative cardiac events
1-Optimisation of medical management.
2-Revascularization by PCI, revascularization by surgery by (CABG).

B-blockers have been shown to be useful in reducing perioperative morbidity and mortality in high risk patients and preferably titrated to a heart rate of 50-60 bpm. Alfa 2 agonists can be useful in patients where Beta blockers are contraindicated. Nitroglycerine lowers LVEDP by reducing preload, it improves collateral coronary flow and reduce systemic blood pressure.
Coronary intervention should be guided by patients' cardiac condition and by potential consequences of delaying noncardiac surgery for recovery after coronary revascularization.

Preanesthetic considerations:
- Preoperative visit is very important
- Consent obtaining
- Explanation about risk factors
- Continue the medication till the day of surgery. Beta blockers, Calcium channel blockers, Digitalis, Potassium level should be normal as hypokalemia can cause digitalis toxicity. Anticoagulants should be stopped.

Premedication:
- To reduce anxiety, to prevent increase in blood pressure and heart rate, which can disturb the myocardial oxygen supply and demand and can induce ischemia.

Combination of Benzodiazebine and opioids should be given one hour prior to arrival in operating room (Figure 1).

Intraoperative management:
- Monitoring:
  - ECG should be set on diagnostic mode, monitoring 3 leads improve recognition of ischemia.
  - Blood pressure, pulse oximetry, capnography, temperature monitoring, urine output monitoring, control of venous pressure and cardiac output, TEE.

Choice of anesthesia:
- Drugs should be selected with the objective of minimizing demand and optimum supply of oxygen and some cardiac drugs should be available to maintain hemodynamics to prevent and treat ischemia if it occurs.

  General anesthesia
  - Intravenous anesthetics
    - Thiopental decreases myocardial contractility, preload and blood pressure with slight increase of heart rate, it should be administered slowly.
    - Propofol decreases blood pressure and heart rate significantly there is adose dependent reduction in myocardial contractility
    - Ketamine is not good with IHD and valvular diseases
    - Midazolam decreases mean arterial pressure and increases heart rate, provide excellent amnesia.
    - Etomidate causes minimum hemodynamic changes. Excellent for induction in patients with poor cardiac reserve.

Narcotics: morphine is the preferred drug for its relative cardiac stability and very good analgesic effect
- Inhalational agents: isoflurane for patients with good myocardial contractility. Halothane has disadvantage of myocardial depression and potential of dysrhythmias.
- Nitrous oxide provides stable hemodynamic
- Muscle relaxants vecuronium produces minimum hemodynamic alteration and is a short acting pipecuronium, mivacurium and dextracurium without any significant cardiovascular side effect.

Managing intraoperative complications:

Figure 1 - Scheme of evaluation of the patient
1-Ischemia if patient hemodynamically stable Beta blockers and nitroglycerine. Heparin after consultation with surgeon. If patient hemodynamically unstable support with inotropes, use of intraoperative balloon pump may be necessary urgent consultation with cardiologist to plan for earliest possible catheterization other complication like dysrhythmias, paemaker dysfunction should managed accordingly.

Postoperative management:

Goals:
- Prevent ischemia, monitor for myocardial infarction, treatment for myocardial infarction.
- Although most cardiac events occurs within first 48 hours delayed cardiac event (with 30 days) still happen, and could be the of secondary stress, postoperative stress of extubation, pain, sepsis, hemorrhage, anemia,, respiratory problems can increase demand on the heart and should be minimized and treated.

Valvular heart diseases:

Patients with valvular heart diseases coming for surgery present many challenges. Now it is no longer necessary or even advisable to delay surgery until advanced symptoms are present. The five variables in dealing with the valvular heart diseases are important I-preload II-afterload III-myocardial contractility IV-heart rate V-rhythm.

Hypertension:

Is the commonest cardiac disease all over the world. These patients are documented to have associated CAD left ventricular dysfunction, renal failure which increase the perioperative risk it is important to control BP preoperatively. But this does not need surgery to be deferred for weeks to achieve ideal blood pressure control, inpatients with mild to moderate hypertension it is important to evaluate for target organ damage. It is advisable to continue antihypertensives till day of surgery. Any factors of sympathetic stimulus should be avoided.

Dysrhythmias:

May be a marker of severity of underlying CAD or left ventricular dysfunction. A symptomatic ventricular ectopies with stable hemodynamic parameters does not need any treatment preoperatively. Prophylactic treatment is not required in supraventricular tachycardia. In a trial fibrillation rate needs to be controlled perioperatively if they occur can be treated by calcium channel blockers beta blockers adenosine.

Patients with conduction delay LBBB do not require pacing unless there is a history of syncope. But in complete heart block patients need to be paced. In patients with pace makers, electro cautery should be used with caution and for minimum period of time. The cautery plate should be as far as possible from the heart. Use of bipolar cautery decreases the risk of pacemaker dysfunction.

5. References