

## A Study Of Perioperative Cardiovascular Events In Non-Cardiac Surgery

Dr. Prashant Bhansali\*, Dr. Ashish Patel\*\*, Dr. Anjali Oza\*\*\*

\*Associate Professor, \*\*MD General Medicine, \*\*\*2nd Year Resident Doctor, Department Of General Medicine, AMC MET Medical College, Ahmedabad - 380008, India

**Abstract:** Background: Perioperative evaluation is an important step before considering a patient for surgery to deal with cardiovascular risk factors. The aim of the study is to evaluate the risk of cardiovascular events during perioperative period in non-cardiac & non-vascular surgery, even in patients with no previous evidence of cardiac disease. Material And Methods: All patients admitted in Orthopaedic, Surgery, Gynaecology department were evaluated clinically as well as with laboratory and radiological investigation. All patients with age > 40 years were subjected to electrocardiography. All the data was collected & recorded in standard Proforma. Clinical evaluation was done preoperatively & 24 hour post operatively. In patients developing cardiovascular complications, additional evaluation was done on the basis of need. Result: Highest number of patients undergoing elective non-cardiac surgery belonged to the younger age group. General surgery had the highest number of patients 45.3%, followed by Orthopaedics (36%), Gynaecology (18.7%). In view of surgery done by 3 above-mentioned surgical branches, there was not much difference in the rate of risk of cardiovascular events. Diabetes mellitus, hypertension, and cardiac diseases were found as frequent risk factors (44 (29.3%), 52 (34.6%), 26 (17.3%) respectively.) Postoperative cardiovascular complication rate was most commonly seen in cardiac diseases, which were 8 (30.7%) patients. The incidence of perioperative cardiac complication in our study was 8.7% with 4% mortality. Conclusion: The incidence of complication was highest in patients undergoing high risk surgeries like intraperitoneal surgery. The RCRI classification was a good preoperative tool for risk stratification of patients undergoing non-cardiac surgery. [Bhansali P Natl J Integr Res Med, 2022; 13(1):23 -26, Published on 26/01/2022]

**Key Words:** Cardiac Risk Factors, Postoperative Period, Diabetes Mellitus, Hypertension

**Author for correspondence:** Dr. Anjali Oza, 2nd Year Resident, AMC MET, Medical College, Ahmedabad-380008. E-Mail: anjalikoza@gmail.com Mobile: 9313861069

**Introduction:** Perioperative evaluation is an important step before considering a patient for surgery. The purpose is not just clearance for surgery, but to perform an overall evaluation of the clinical status, deal with cardiovascular risk factors or cardiac problems, improve and stabilize them with the best possible level and estimate the overall risk of surgery. By evaluating patient for patient preoperatively, the medical team and patient can decide the best way to minimize complications<sup>1</sup>. In addition to clinical experience and common sense, algorithms for perioperative evaluation have been proposed, tested, and validated to contribute to this decision.

In addition, most of the assessments have been based upon clinical characteristics of patients submitted to surgery in the past 10 years prior to surgery. The single largest cause of death is major adverse cardiac events (MACE), mostly acute coronary syndrome<sup>2</sup>. The spectrum of myocardial damage is broader than ever before, with asymptomatic troponin rise now known to be strongly associated with mortality. The term,

myocardial injury after non-cardiac surgery (MINS), is now widely recognized, and potential therapies in the perioperative context continue to develop<sup>4</sup>. New postoperative arrhythmias, with paroxysmal atrial fibrillation (AF) being the most common, occur in 3% of patients. Many resolve spontaneously, but if paroxysmal AF persists then the one-year absolute risk of stroke is 1.5% vs 0.3% for those in sinus rhythm.

Furthermore, heart failure, myocardial infarction & cardiac arrest are also more common in patients with paroxysmal AF<sup>3</sup>. According to the British Heart Foundation, approximately 1.8 million people in India have a diagnosis of heart failure, & these patients frequently present for surgery. In addition, echocardiographic sampling of the general population ( Mean age of 52 years) demonstrated a 27% incidence of diastolic dysfunction, which is a significant risk factor for developing postoperative cardiovascular events, particularly diastolic heart failure. Regardless of etiology, postoperative cardiac failure has a 30-day mortality of 8%<sup>5</sup>. The aim of the study is to

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evaluate the risk of cardiovascular events during perioperative period in non-cardiac & non-vascular surgery, even in patients with no previous evidence of cardiac disease.

**Material & Methods:** Study Design: This is a retrospective study that includes randomly selected 150 patients undergone elective non-cardiac surgery in Orthopaedic, Surgery, Gynaecology department over a period of 1 year from 01/10/2016 to 30/09/2017 at Sheth L.G. General Hospital & AMC MET Medical college.

Sample Size: 150 patients.

Inclusion Criteria: Age > 18 years. Patients who were undergone elective non-cardiac & non-vascular surgery in Orthopaedic, Surgery, Gynaecology department. Patients who were willing to give consent.

Exclusion Criteria: Age < 18 years. Emergency surgeries. Cardiac surgeries & vascular surgeries Surgeries which were undertaken in Ophthalmic and Ear, Nose, Throat Department. Patients who were not willing to give consent.

Methodology: All patients admitted in Orthopaedic, Surgery, Gynaecology department were evaluated clinically as well as with laboratory and radiological investigations.

All patients were subjected to Complete blood count, Random plasma glucose, Serum creatinine, Serum electrolytes, Prothrombin time & HBsAg. All patients with age > 40 years were subjected to electrocardiography. All patients with past history of diabetes mellitus & RBS > 160 mg / dl were evaluated by FBS, PPBS, HbA1C. All patients with a history of asthma, chronic obstructive pulmonary disease, ischemic heart disease were subjected to chest radiograph in posteroanterior view. All patients with a history of chest pain on exertion were evaluated by treadmill test, if feasible and not contraindicated.

Echocardiography Was Done In The Following Patients With History Of:

- Dyspnea on exertion ( DOE )
- Dyspnea on exertion and ischemic heart disease
- Patient with history of valvular heart disease
- Patient with history of DOE and abnormal electrocardiogram

- Patient with history of left ventricular dysfunction & congestive cardiac failure
- Patient with presence of S3 or S4 gallop or any murmur on cardiac auscultation

All the data was collected and recorded in standard proforma. Clinical evaluation was done preoperatively & 24 hour post operatively. In patients developing cardiovascular complications, additional evaluation was done on the basis of need.

**Results:** Results are as follows.

**Table 1: Past History Of Participants**

Past History	Number Of Patients	Number Of Cardiac Events
Diabetes Mellitus	44 (29.3%)	3 (6.84%)
Hypertension	52 (34.6%)	4 (7.69%)
Cardiac Disease	26 (17.3%)	8 (30.7%)

In our study, we found that perioperative cardiac events are more common in patients with cardiac diseases (30.7%) followed by hypertension (7.69%) and diabetes mellitus (6.84%).

**Table 2: Department Of Surgery Of Participants**

Surgery	Number Of Patients	Number Of Cardiac Events
General Surgery	68 (45.3%)	7 (10.2%)
Orthopedics	54 (36%)	4 (7.4%)
Gynecology	28 (18.7%)	2 (7.14%)
Total	150 (100%)	13 (8.7%)

In our study, we found that perioperative cardiac events were more common in patients undergone general surgery (10.2%) followed by orthopedic (7.4%) and gynecology (7.14%)

**Table 3: Revised Cardiac Risk Index**

Revised Cardiac Risk Index	Number Of Patients	Number Of Cardiac Events
High Risk Surgery	39 (26%)	5(12.8%)
Ischaemic Heart Disease	22 (14.6%)	8(36.36%)
History Of Heart Failure	4 (2.6%)	1(25%)
Cerebrovascular Stroke	6 (4%)	-
Pre-Op Insulin Therapy	38 (25.3%)	1(2.6%)
Preoperative Creatinine > 2 mg/dl	8 (5.3%)	1(12.5%)

In the current study, According to revised cardiac index, we found that perioperative risk of cardiac events was more common in patients with ischemic heart disease (36.36%) followed by history of heart failure, high risk surgery, creatinine >2mg/dL and pre op insulin therapy.

**Table 4: Electrocardiography & Echocardiography**

Cardiac Diagnosis	Number Of Patients
Abnormal ECG	33 (22%)
Abnormal Echo	19 (12.6%)

In the present study, by examination of cardiac investigation, we found that ECG was abnormal in 22% of patient and Echo was abnormal in 12.6%.

**Table 5: Types Of Cardiovascular Events**

Type Of Cardiovascular Events	Number Of Patients
Death	6
ST Elevation Myocardial Infarction	1
Non ST Elevation Myocardial Infarction	2
Ventricular Premature Contraction	1
Acute Left Ventricular Failure	2
Atrial Fibrillation	1
Total	13

In our study 13 out of 150 patients developed cardiovascular events among which most common cardiac complication was death(46% of patients) followed by acute LVF and NSTEMI in 15% each.

**Discussion:** With advancement of surgical and anesthesia techniques, elective non-cardiac surgeries have become increasingly safe. However still a significant number of patients develop different postoperative complications.

In the immediate postoperative period, mainly cardiovascular events occur. Careful and systematic preoperative evaluation of such patients may allow us to develop a strategy / protocol to reduce such complications. With this objective in the mind we initiated the present study.

Highest number of patients undergone elective non-cardiac surgery belong to the younger age group. Almost 60 % of patients were < 50 years old. The mean age of patients was 47.5 ± 12.5 years. Among all, the highest numbers of

cardiovascular events were seen in the 71-80 years age group followed by 18-20 years & 51-60 years of age.

Diabetes mellitus, hypertension & cardiac diseases were found as frequent risk factors (44 (29.3%), 52 (34.6%), and 26 (17.3%) respectively).

Postoperative cardiovascular complication rate most commonly seen in cardiac diseases, which was 8 (30.7%) patients.

Out of 150 patients, 39 (26%) patients were to undergo high risk surgeries rendering them at high risk of postoperative cardiovascular events.

Apart from types of surgery the other contributing high risk patient factors for postoperative cardiovascular events were Diabetes [38 (25.3%)], CAD [22(14.6%)], altered creatinine of more than 2.0 mg / dL [8 (5.3%)].

CVA & history of heart failure were 4% & 2.6% respectively. In this risk index maximum risk of cardiac complication was seen with ischemic heart disease.

General surgery had the highest number of patients 45.3% followed by Orthopedics (36%), Gynecology (18.7%). In view of surgery done by 3 above-mentioned surgical branches, there was not much difference in the rate of risk of cardiovascular events but cardiac complications were more frequent in high risk surgery like intra peritoneal surgery, which complications were increasingly seen in our study populations.

Abnormal electrocardiogram (22%) & abnormal echocardiogram (12.6%) were found in a significant number of patients undergoing non cardiac surgery.

4 % of patients expired due to sudden cardiac arrest or multifunctional organ failure. Other than death, most frequent cardiovascular complications seen were acute left ventricular failure and acute coronary syndrome.

In our study the patients who were undergone elective non-cardiac surgery & not having risk factors which were included in revised cardiac risk index, cardiovascular events were 5.2%, which was less than those having risk factors according to revised cardiac risk index were 10.2%.

**Conclusion:** The incidence of perioperative cardiac complication in our study was 8.7% with 4% mortality. Past history of ischemic heart disease & hypertension were independent predictors of perioperative cardiovascular events. The incidence of complication was highest in patients undergoing high risk surgeries like intraperitoneal surgery. The revised cardiac risk index classification was a good preoperative tool for risk stratification of patients undergoing non-cardiac surgery.

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