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A Study of Electrocardiograph (ECG) Measurement before Elective non-Cardiac Surgery in a Tertiary Hospital

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ABSTRACT

Cardiovascular complications are a major cause of preoperative morbidity and mortality in patients undergoing no cardiac surgery. So this study was planned to find out the occurrence of ECG abnormalities in preoperative patients posted for elective non cardiac surgery . A retrospective evaluation of ECG involving 125 patients posted for elective non-cardiac surgery at Viswabharathi Medical College General Hospital, Kurnool was done. ECG abnormalities found in 45 cases (36.20%) out of 125 preoperative patients. Sinus tachycardia and sinus bradycardia were the common ECG abnormalities Hypertensive (65.8%) and diabetic (73.6%) patients had higher incidence of abnormal preoperative ECG when compared to their normal counterparts (p-value <0.001). In conclusion, there must be an ECG prior to any elective surgery because preoperative testing offers a stage for detection of asymptomatic significant cardiac abnormalities.

Keywords: *ECG, pre-operative patients, non- cardiac surgery, sinus tachycardia*

INTRODUCTION

Preoperative risk is multifactorial and depends on the medical condition of the patient, the invasiveness of the surgical procedure and the type of anesthetic administered.[1]

Cardiovascular complications are a major cause of preoperative morbidity and mortality in patients undergoing no cardiac surgery. Neither preoperative ECGs nor results of preoperative screening questionnaires were predictive of adverse cardiovascular preoperative events questioning the utility of preoperative ECGs in the ambulatory surgery setting, in younger, relatively healthy patients.[2] Age, increased physical status score, and male gender were associated with a greater incidence of abnormal preoperative ECGs.[2]

For the purpose of the preoperative assessment, an ECG is considered abnormal when the following abnormalities are present - some abnormal rhythms (atria fibrillation/flutter, pacemaker rhythm, and ventricular extra systoles). pathological Q waves, left ventricular hypertrophy, ST-T changes, conduction defects etc.(disease requiring surgical intervention)

Finally, a cardio logical assessment is indicated if the ECG is abnormal. Routine electrocardiography has the potential to detect diseases those can have impact on preoperative care in selected patients. The availability of an ECG may be useful in determining if it is appropriate to proceed.[3]

Patients with coronary artery disease undergoing major non-cardiac surgery guidelines concerning preoperative evaluation, stress testing, coronary angiography, and revascularization is justified.[4]

Based on the American College of Cardiology and American Heart Association guidelines and data from contemporary studies, patients without risk

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factors are considered to be at low risk and do not require additional evaluations for coronary artery disease. Patients with 1 or 2 cardiac risk factors represent an intermediate-risk group for preoperative cardiac complications Patients with 3 or more risk factors are at high risk for cardiac complications and the use of noninvasive testing may help further refine cardiac risk based on the presence and absence of test-induced myocardial ischemia.[5] Noninvasive testing offers only limited assistance in estimating risk for these patients.[6] However a study was planned to assess the utility of routine ECG in clinically stable preoperative patients. So the aim of the study was to find out the incidence of ECG abnormalities in preoperative patients posted for elective non cardiac surgery and also to access the co-relation of risk factors with ECG abnormalities.

METHOD

This study was a retrospective evaluation of ECG involving 125 patients posted for elective non-cardiac surgery at Viswabharathi Medical College General Hospital, Kurnool. A detailed history was taken in order to find out the risk factors. These patients were advised ECG for preanesthetic checkup. Institutional ethics committee approval was taken prior to the start of study. Exclusion criteria were pregnant females, hemodynamically unstable patients and those undergoing emergency surgeries. Clinical examination was done as per proforma followed by recording of 12 lead ECG in all the patients in addition to routine biochemistry and chest x ray. This study was conducted over a period of 6 months from January 2012 to June 2012.

Electrocardiographic (ECG) results with atrial fibrillation, left or right bundle branch block, left ventricular hypertrophy, premature ventricular complexes, pacemaker rhythm, or Q-wave or ST-segment changes and QT prolongation and rhythm abnormalities were classified as abnormal. Data collected were expressed in percentage (%) and to know the test of significance chi-square test was used. The level of significance was set at $P<0.05$.

RESULTS

80 males and 45 females were enrolled for this study. Out of these 125 cases, 20 (16.3%) cases were from general surgery, 35 (28.8%) orthopedics, 40 (32.1%) ophthalmology, 15 (12.1%) ENT and 15 (12.1%) from gynecology department (table-1).

70 cases out of total cases had a risk factor or disease; 6(8.66%) had history of cardiovascular disease, 20(28.99%) with hypertension, 15 (21.35%) with diabetes and 29 (41.20%) were smokers (Fig-1).

Preoperative ECG was normal in 80 (64.50%) and abnormal in 45 (36.50%) patients.

Sinus tachycardia was the most common rhythm abnormality observed in 15 (18.81%) cases. Other rhythm abnormalities were sinus bradycardia in 9 cases (8.25%), ventricular premature complexes in 3 cases (1.55%).

Conduction defects included first degree heart block in 3 cases (2.59%), left bundle branch block in 1 case (0.52%), complete right bundle branch block in 3 (4.14%), incomplete right bundle branch block in 1 case (0.52%) and left anterior hemi block in 3(5.69%) cases. Left atrial enlargement in 3 (1.036), biatrial enlargement in 1(0.52%), left ventricular hypertrophy is present in 5 cases (3.11%)

Further , ECG abnormalities consist of Infer lateral ischemia in 2 cases (1.55%), anterior wall ischemia in 2(1, 55%). ECG changes suggestive of old myocardial infarction were present in 3 cases (2.59%). Additional changes include poor progression of R wave in 2(1.55%), and prolonged QT in 1 (0.52%).

Hypertensive patients had higher incidence of abnormal preoperative ECG 13/20 (65.88%) compared to normotensives (p value<0.0001) and even diabetic patients had higher incidence of abnormal ECG 11/15 (73.61%) versus non-diabetics (p value <0.0001.). Patients with known cardiovascular disease had higher incidence of abnormal ECG 4/6 (67.89%) than without cardiovascular disease (p value<0.001). 20 (68.41%) smokers versus 29 non smokers had abnormal ECG (p value <0.0001.).

DISCUSSION

Our study showed that majority of preoperative ECG was normal and preoperative testing should generally be directed by a targeted history, physical examination, and the relevance of any tests should be considered in light of the type of procedure that is planned, particularly the hemodynamic changes and blood loss involved.

This study detected ECG abnormalities in 45

preoperative patients. Common ECG abnormalities included sinus tachycardia and sinus bradycardia . Rationally sinus tachycardia is not an abnormality requiring cardiac intervention.

Hypertensive and diabetic patients had higher incidence of abnormal preoperative compared to normotensives subjects. Patients with known cardiovascular disease also had higher incidence of abnormal ECG. Moreover, ECG abnormality increased with every decade after 40

Some studies have questioned the utility of preoperative ECG for screening asymptomatic individuals undergoing a variety of surgical procedures but they concur to the point that clinical risk factors should form the basis of risk assessment and prediction.[7] Further the usefulness of its routine use in lower risk surgery is questionable.[8]

Even though, electrocardiogram (ECG) monitoring has been included in the minimum mandatory monitoring guidelines, but there is no complete accord as to which patients should have a preoperative ECG.[9]

The objective of the preoperative cardiac risk assessment is to evaluate the presence and degree of coronary artery disease along with other risk factors such as cerebrovascular disease, renal insufficiency, and diabetes mellitus that may influence the preoperative risk of this patients.[10]

Patients with >or=3 risk factors or active cardiac conditions should undergo stress testing.[11]

Performing routine screening tests in patients who are otherwise healthy is invariably of little value in detecting diseases and in changing the anesthetic management or outcome.[12]

Our study strengthens the importance of preoperative ECG monitoring in those with risk factors like diabetes, hypertension and cardiovascular disease.

We suggest that there is a need for an ECG prior to any elective surgery because preoperative testing offers a stage for detection of asymptomatic significant cardiac abnormalities that may require further follow up in future.

Table 1 Distribution of Cases According to Surgery

Surgeries	Male	Female	Percentage of total cases
General Surgery	09	11	16.3%
Orthopedics	25	10	28.4%
Ophthalmology	28	12	32.3%
ENT	10	5	12.1%
Gynecology	0	15	12.1%
TOTAL	72	53	

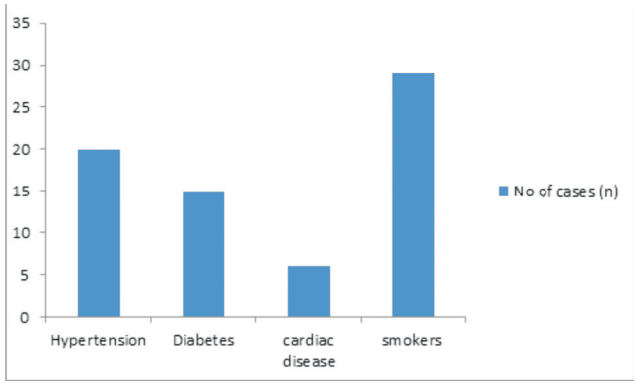

Figure 1: Risk factors of the pre-operative patients

CONCLUSION

ECG being a simple non-invasive and economical tool should be done to all patients undergoing elective procedures and it must be mandatory for those with risk factors.

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