

**Evaluation of Routine Preoperative Electrocardiogram-A Lagos State University Teaching
Hospital Study**

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Abstract

Introduction

Patients who are 40yrs and above are required to have routine preoperative electrocardiogram (ECG) prior to major elective surgery in our practice. This is aimed at detecting cardiac abnormalities that may contribute to peri- and post-operative morbidity and mortality. There is paucity of literature on this subject among black population. This study aims to describe the prevalence of abnormal ECG findings in routine pre-operative ECG in our patient population.

Methods

One hundred and twenty adult patients consisting of 40 males and 80 females, who were referred for routine pre-operative ECG from February 2010 and February 2011, had their ECG tracing subsequently analyzed for the presence of ECG abnormalities. Chi square and Student's t-test were the statistical tests employed.

Result

The mean age of patients studied was 56.4 ± 5.2 yrs (range 40 to 80yrs). About a third of the patients had abnormal ECG readings and these included left axis deviation (LAD), right bundle branch block (RBB). The commonly noted abnormalities were left ventricular hypertrophy (LVH) and LAD.

Patients who were 50yrs and above, were more likely to have abnormal ECG findings compared to their younger counterparts and this was statistically significant ($\chi^2 = 8.367$; p value= 0.002).

Conclusion

The present study suggests that most of the pre-operative ECG abnormalities are benign in nature and are unlikely to influence the course of surgery. An ongoing larger multicenter study would further shed light on this subject.

Key words: *Routine, pre-operative electrocardiogram (ECG), Elective surgery*

Introduction

Routine electrocardiogram (ECG) is carried out in our local practice as part of preoperative assessment of patients over the age of 40 years going for elective surgery. This is aimed at unmasking underlying cardiac abnormalities that could result into adverse peri-operative events. Studies have shown that routine use of preoperative ECG screening in patients who do not have previous cardiac history has limited diagnostic and clinical values.^{1,2,3} This practice adds to the cost of peri-operative care and may result in unnecessary additional investigations and treatment of healthy individuals with abnormal results. A more selective approach towards requests for preoperative ECG is found to improve cost-effectiveness and reduces the number of unnecessary tests.^{3,4} However, other studies suggested continuous use of routine preoperative ECG in all elderly patients.^{5,6} The study by Liu et al⁷ suggest that even though elderly patients are more likely to have abnormalities on pre-operative ECG, clinical co-morbid indices are more reliable in predicting surgical outcome in these patients.

Abnormal findings on routine ECG have been reported in apparently healthy African populations.^{8,9} In a study conducted in South Africa, 16% of urban Africans were found to have abnormal ECG.⁸ There is paucity of literature on routine pre-operative ECG evaluation in the African population. On the other hand, routine preoperative ECG carried out among adult Caucasians revealed a significant number of patients who had abnormal ECG findings.^{4,5,6} Surgical care in many resource poor countries is still a major challenge. Majority of patients are poor and cannot readily afford cost of investigations and surgery. Request for unnecessary tests adds to the burden and puts more strain on patients' resources.

Lagos State University Teaching Hospital (LASUTH) which until a decade ago was a well attended General Hospital currently offers tertiary care to a large proportion of residents of Lagos State with a population of more than 9 million. Records of peri-operative cardiac events in patients who have had surgery in LASUTH are not available at the moment.

The aim of this study, therefore, is to assess the value of routine preoperative ECG in a cohort of patients being prepared for elective surgical procedures at the Lagos University Teaching Hospital (LASUTH), Ikeja. This may assist in determining the appropriateness of such practice in our setting.

Methods

The ECG of one hundred and twenty consecutive patients who were referred for the routine preoperative test from February 2010 to February 2011, were recorded using Schiler Multichannel ECG machine. The recording protocol was based on established guidelines¹⁰ which expect that the patient lies supine in a relaxed atmosphere with all metallic objects and apparels removed before the recording. Non-irritant gel is appropriately applied to the skin and the standard leads are placed.

The ECG tracings were recorded at 25mm/sec and subsequently evaluated for the presence of anomalies like cardiac arrhythmias, heart blocks, left ventricular hypertrophy (LVH) and myocardial ischemia/infarction. The age, gender, preoperative surgical diagnoses of the patients

were also noted. Patients who were previously diagnosed with cardiac disease were excluded from the study.

This was a descriptive, cross-sectional study. The proportion of patients with ECG abnormalities was expressed in percentages. Quantitative and qualitative data were analyzed with the Students' t-test and Chi square respectively. SPSS was used for analysis.

Results

128 patients consisting of 40 males and 80 females had preoperative ECG evaluation. The mean age of the patients was 56.4 ± 5.2 yrs (range 40-80 yrs). All the patients were scheduled for major surgeries that would require general anesthesia.

Majority of the patients had no ECG abnormality whatsoever. However, 38 patients (32%) consisting of 22 females and 16 males, had abnormal ECG findings. The prevalence of ECG abnormalities was much higher in the older age groups (50yrs and above) compared to the younger patients and this was statistically significant ($\chi^2 = 8.637$; p value= 0.002). The results are shown in table 1.

The most common abnormal ECG findings were Left Ventricular Hypertrophy (LVH)-found in 12 patients; Left Axis Deviation (LAD) in 10 patients; Right Bundle Branch Block (RBBB) in 4 patients; Unifocal Ventricular Premature Contraction (VPC) in 4 patients; first degree Atrio-Ventricular (A-V) Block; and myocardial ischemia in 3 patients respectively (see Fig. 1). 2 patients had bifascicular block i.e. RBBB with LAD (Fig. 2) and 1 patient had tracings suggestive of Wolf-Parkinson-White (WPW) syndrome (an anomaly of aberrant conducting pathways).

It is important to emphasize that some patients had multiple abnormalities on the same ECG tracing. Abnormal ECG findings were seen in different surgical diagnoses and were not restricted to a particular gender although the prevalence was relatively higher in males (40%) compared to female patients (27.5%). The difference however, was not statistically significant. ($\chi^2=1.812$; p value= 0.126).

Discussion

The present study confirms the fact that majority of routine preoperative ECG tests are normal. This is similar to the findings of previous studies on the subject.^{1, 2, 3, 4} However, our study also reveals that a significant proportion of preoperative ECG results are abnormal. 32% of the patients in the study had abnormal ECG compared to 38% in a study among Caucasians.⁴ Apart from the 3 patients with ECG features of myocardial ischemia and the sole patient with WPW aberrant pathways, all the other abnormal findings are generally benign and are unlikely to impact surgical outcome in the patients. ECG findings of LVH, LAD, RBBB, first degree AV block and Unifocal VPC have however, been reported in apparently healthy individuals.¹¹⁻¹⁵ It is also important to note that most of the patients with ECG abnormalities were above the age of 50 years. This suggests that abnormal pre-operative ECG findings are more likely in the older age groups. More than 75% of the 513 elderly patients (≥ 70 yrs old) studied by Liu et al, had

abnormal ECG findings.⁷ These were not associated with increased risk of peri-operative cardiac complications in that study (OR=0.63; p-value=0.26).

The study by Thanh et al,¹⁶ revealed that only 13.4% of patients who underwent elective surgery over a 2-year period in Alberta-Canada had pre-operative ECG tests most (80%) of which was carried out on patients who were 50 years and above. The authors were of the opinion that the low utilization of mandatory pre-operative ECG reduced the overall cost of medical care considerably in that region. The implication of the above observations is that the age cut off of 40 years and above, set for the test in our local surgical practice could be reviewed upward. Since most of the abnormalities found are benign in nature, pre-operative clinical indices are probably more reliable than ECG in predicting surgical outcomes in these patients as noted by Liu et al.⁷ The influence of gender in the present study is difficult to ascertain because of the skewed distribution. However, preliminary observation revealed a higher prevalence of ECG abnormalities in males compared to the female patients. The reason for this observation is not too obvious although the male patients are generally older than the female patients in the present study.

The implication of the above findings is that a stricter criteria for mandatory routine pre-operative ECG which takes into consideration factors like age (>50yrs), hypertensive or diabetic status of the patient and presence of underlying cardiac disease may be necessary. Patients with significant ECG abnormalities can subsequently be selected for further clinical and cardiac (laboratory) evaluation prior to surgery. This will be more cost effective and enhance the quality of pre-operative cardiac risk assessment.^{16,17,18} The routine use of intra operative ECG monitoring in selected high risk patients as recently introduced in LASUTH will also help in reducing peri-operative cardiac events and mortality.

Conclusion

The present study revealed that routine pre-operative ECG tracings are usually normal and that most of the abnormal findings are benign in nature. This implies that although the test is relatively affordable, it is not cost effective and should not be mandatory for all the patients scheduled for major surgery. The limitation of the present study includes the, relatively small sample size and the fact that further echocardiography to exclude the presence of clinically silent structural heart disease was not carried out.

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Table 1: Prevalence of ECG Abnormalities among different Age Groups

AGE OF PATIENTS (YRS) (n)		ECG ABNORMALITIES (%)	P Value
<50yrs	45	7 (15.5%)	$\chi^2 = 16.9$ P value = 0.017
50 – 59	35	15 (42.8%)	
60 – 69	29	10(34.4%)	
>70 yrs	11	6 (54.5%)	

Fig. 1: Distribution of ECG Abnormalities among the Patients

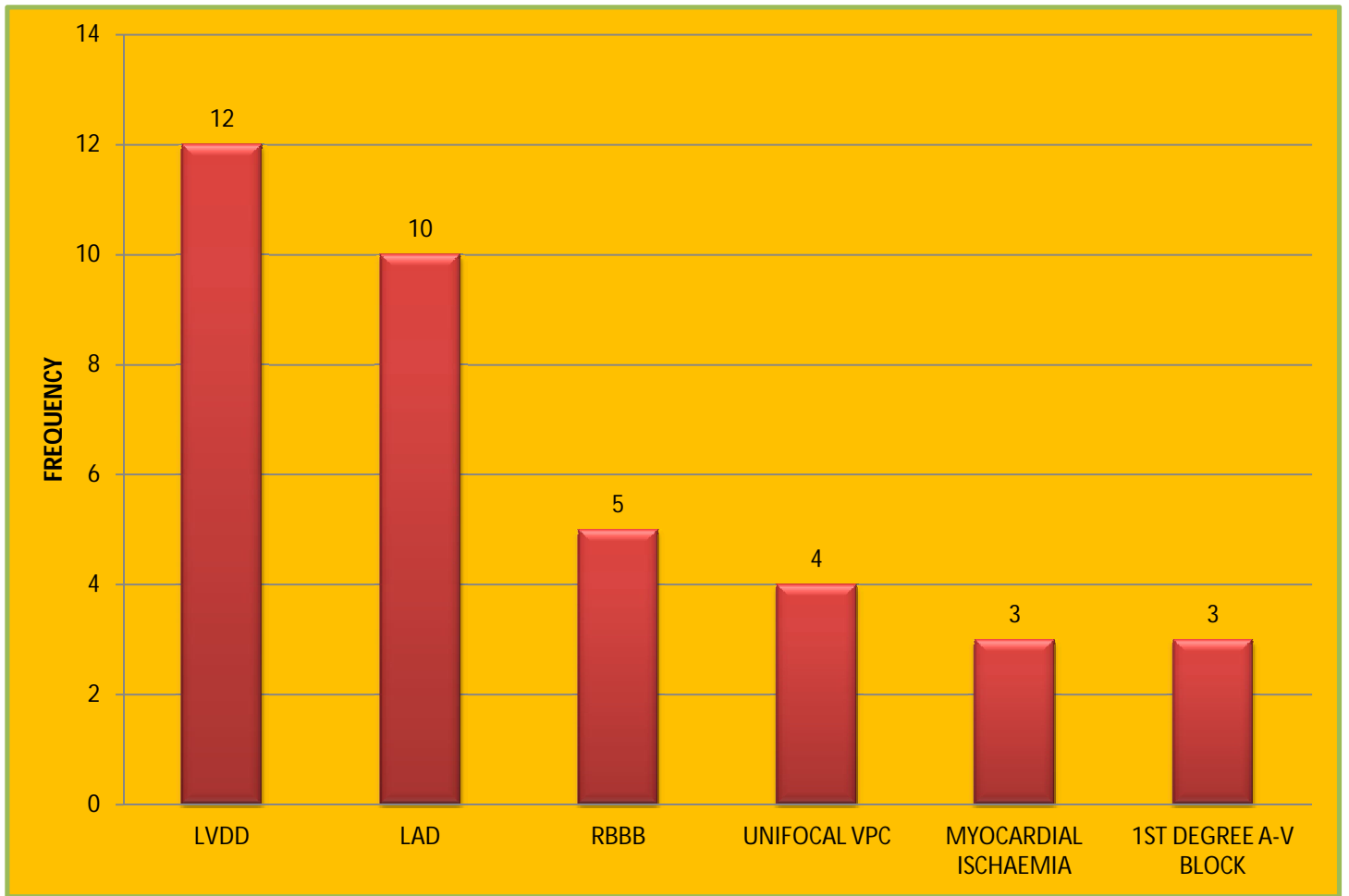


Fig. 2a: Pre-operative ECG tracings (Limb Leads) of a 63 year old male patient with Bifascicular Block (Complete Right Bundle Branch Block with Left Axis Deviation)

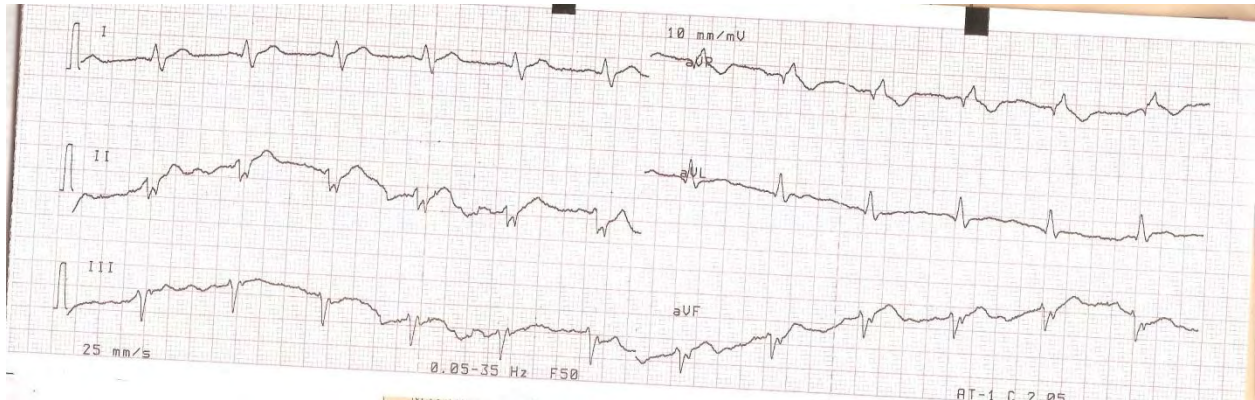


Fig. 2b: Pre-operative ECG tracings (Precordial leads) of 63 year old male patient with Bifascicular Block (Complete Right Bundle Branch Block with Left Axis Deviation).

