

Incidental ECG and Echo-Cardiographic Findings among Patients Who Underwent Elective Operation for Orthopedic Injuries in a Tertiary Hospital of Bangladesh

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Abstract

Background: Cardiovascular disease (CVD) is a class of diseases that involve the heart or blood vessels. Cardiovascular disease includes coronary artery diseases (CAD) such as angina and myocardial infarction (commonly known as a heart attack). Other CVDs include stroke, heart failure, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, heart arrhythmia, congenital heart disease, valvular heart disease, carditis, aortic aneurysms, peripheral vascular disease (PVD), thromboembolic disease, and venous thrombosis. The underlying mechanisms vary depending on the disease. Coronary artery disease, stroke, and peripheral artery disease involve atherosclerosis. This may be caused by high blood pressure, smoking, diabetes, lack of exercise, obesity, high blood cholesterol, poor diet, and excessive alcohol consumption, among others. Studies to assess incidence of CVD in Bangladesh is rare.

Methods: This retrospective cross-sectional analytical study was carried out in the orthopedic in-patient department of National Institute of Traumatology and Orthopedic Rehabilitation (NITOR) for one year (July 2015 - June 2016) among all patients above 18 years of age with clinically and radiologically proved as orthopedic problems. Purposive sampling technique was adopted and 1000 patients who underwent elective operation were included in this study with an aim to find incidence of CVD among the study population.

Results: Our study found that 88(8.8%) had previously diagnosed Cardiovascular Diseases (CVD), 116 (11.6%) were known hypertensive. Pre-anesthetic check-up (PACU) for planned operation incidentally found that 511(51.1%) had some sort of CVDs which includes hypertensive heart disease(8.9%), cerebrovascular Diseases (8.5%), endocarditis (6.7%), PVD (6.1%), CAD (5.0%) among others. 80% patients had some kind of abnormal ECG findings.

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Introductions

Cardiovascular disease (CVD) is a class of diseases that involve the heart or blood vessels.¹ Cardiovascular disease includes coronary artery diseases (CAD) such as angina and myocardial infarction (commonly known as a heart attack).¹ Other CVDs include stroke, heart failure, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, heart arrhythmia, congenital heart disease, valvular heart disease, carditis, aortic aneurysms, peripheral artery disease, thromboembolic disease, and venous thrombosis.^{1,2} The underlying mechanisms vary depending on the disease.¹ Coronary artery disease, stroke, and peripheral artery disease involve atherosclerosis.³ This may be caused by high blood pressure, smoking, diabetes, lack of exercise, obesity, high blood cholesterol, poor diet, and excessive alcohol consumption, among others.¹ High blood pressure results in 13% of CVD deaths, while tobacco results in 9%, diabetes 6%, lack of exercise 6% and obesity 5%.¹ Rheumatic heart disease may follow untreated strep throat.¹ It is estimated that 90% of CVD is preventable.⁴ Prevention of atherosclerosis involves improving risk factors through: healthy eating, exercise, avoidance of tobacco smoke and limiting alcohol intake.¹ Treating risk factors, such as high blood pressure, blood lipids and diabetes is also beneficial.¹ Treating people who have strep throat with antibiotics can decrease the risk of rheumatic heart disease.⁵ The use of aspirin in people, who are otherwise healthy, is of unclear benefit.^{6,7} Cardiovascular diseases are the leading cause of death globally.¹ This is true in all areas of the world except Africa.¹ Together they resulted in 17.9 million deaths (32.1%) in 2015, up from 12.3 million (25.8%) in 1990.^{3,2} Deaths, at a given age, from CVD are more common and have been increasing in much of the developing world, while rates have declined in most of the developed world since the 1970s.^{8,9} Coronary artery disease and stroke

account for 80% of CVD deaths in males and 75% of CVD deaths in females.¹ Most cardiovascular disease affects older adults. In the United States 11% of people between 20 and 40 have CVD, while 37% between 40 and 60, 71% of people between 60 and 80, and 85% of people over 80 have CVD.¹ The average age of death from coronary artery disease in the developed world is around 80 while it is around 68 in the developing world.⁸ Disease onsets is typically seven to ten years earlier in men as compared to women.¹⁰ There are many risk factors for heart diseases: age, gender, tobacco use, physical inactivity, excessive alcohol consumption, unhealthy diet, obesity, genetic predisposition and family history of cardiovascular disease, raised blood pressure (hypertension), raised blood sugar (diabetes mellitus), raised blood cholesterol (hyperlipidemia), undiagnosed celiac disease, psychosocial factors, poverty and low educational status, and air pollution.¹¹⁻¹⁶ While the individual contribution of each risk factor varies between different communities or ethnic groups the overall contribution of these risk factors is very consistent.¹⁷ Some of these risk factors, such as age, gender or family history/genetic predisposition, are immutable; however, many important cardiovascular risk factors are modifiable by lifestyle change, social change, drug treatment (for example prevention of hypertension, hyperlipidemia, and diabetes).¹⁸ People with obesity are at increased risk of atherosclerosis of the coronary arteries.¹⁹ This retrospective cross-sectional analytical study was carried out in the orthopedic inpatient department of NITOR for one year (July 2015 - June 2016) among patients aged more than 18 years with clinically and radiologically proved as orthopedic problem to see the incidence of CVDs in patients who underwent elective operation for orthopedic injuries. Documents were reviewed for this purpose.

Methods

A retrospective cross-sectional analytical study was carried out in orthopedic inpatient department of NITOR for one year (July 2015 - June 2016) among patients aged more than 18 years with clinically and radiologically proved as orthopedic problems. Purposive sampling technique was adopted for this study. Patients who underwent operation for orthopedic injuries were included in this study. After explaining the purpose of the study, data was collected by using a preformed and pretested semi structured data collection sheet through face to face interview. Some data were collected from biochemical and imaging report of hospital records. After collection, all the data were checked, edited, organized in tables and analyzed.

Results

Among one thousand patients (N=1000) 570 (57%) were male, 430 (43%) were female, maximum 268 (26.8%) were from Dhaka division. Inclusion from other divisions were Chittagong-12.4%, Khulna-9.6%, Barisal-11.6%, Rajshahi-10.4%, Mymensingh-11.2%, Sylhet-9.6%, Rangpur-8.4%.

Table I: Age group of the participants

| Age group (yrs) | Frequency | Percentage |
|-----------------|-----------|------------|
| Below 30 | 116 | 11.6 |
| 31-40 | 152 | 15.2 |
| 41-50 | 192 | 19.2 |
| 51-60 | 328 | 32.8 |
| More than 60 | 212 | 21.2 |
| Total | 1000 | 100.0 |

Table II: Occupation of the participants

| Occupation | Frequency | Percentage |
|-----------------|-----------|------------|
| Housewife | 204 | 20.4 |
| Private Service | 84 | 8.4 |
| Business | 72 | 7.2 |
| Govt. Service | 52 | 5.2 |
| Laborer | 232 | 23.2 |
| Student | 96 | 9.6 |
| Retired | 60 | 6.0 |
| Farmer | 80 | 8.0 |
| Others | 120 | 12.0 |

| | | |
|-------|------|-------|
| Total | 1000 | 100.0 |
|-------|------|-------|

Table III: Religion of the participants

| Religion | Frequency | Percentage |
|------------|-----------|------------|
| Islam | 714 | 71.4 |
| Hinduism | 202 | 20.2 |
| Buddhist | 12 | 1.2 |
| Christians | 12 | 1.2 |
| Total | 1000 | 100 |

Among the participants, 192 (38.4%) were married whereas 18.0% were unmarried, 19.2% widow, 15.2% widower and 9.2% were separated. According to socioeconomic condition, maximum participants 492(49.2%), 368(36.8%) and 14.0% were from low, medium and high socio-economic group respectively. Residence-wise 522(52.2%) were from urban area (in-side city corporations) and 478(47.8%) were from rural area (out-side city corporations).

History of past illness revealed that 40.0% of participants had COPD, 12.8% had DM, 11.6% had HTN, 8.8% had CVD, 2.0% had TB and 1.6% CKD, whereas 23.2% had no significant past illness. Maximum (75.2%) participants visited hospital previously for some illness while others did not.

Table IV: Clinical Diagnosis during Pre-anesthetic check-up (PACU)

| Diagnosis | Frequency | Percentage |
|-----------------------------|-----------|------------|
| NO Cardiac Disease | 489 | 48.90 |
| Coronary artery disease | 50 | 5.00 |
| Peripheral arterial disease | 60 | 6.00 |
| Cerebrovascular disease | 85 | 8.50 |
| Cardiomyopathy | 47 | 4.70 |
| Hypertensive heart disease | 89 | 8.90 |
| Heart failure | 23 | 2.30 |
| Pulmonary heart disease | 24 | 2.40 |
| Cardiac dysrhythmias | 21 | 2.10 |
| Endocarditis | 67 | 6.70 |
| Myocarditis | 33 | 3.30 |
| Rheumatic heart disease | 12 | 1.20 |

1000 100.0

Table V: ECG findings before operations

| Findings | Frequency | Percentage |
|--------------------------------------|-----------|------------|
| Hypokalemia | 128 | 12.8 |
| Right ventricular hypertrophy | 88 | 8.8 |
| Wolff–Parkinson–White syndrome (WPW) | 116 | 11.6 |
| Left axis deviation | 50 | 5.0 |
| Hypercalcemia | 16 | 1.6 |
| Right axis deviation | 150 | 15.0 |
| First-degree atrioventricular block | 16 | 1.6 |
| Hyperkalemia | 16 | 1.6 |
| ECG normal | 420 | 42.0 |
| | 1000 | 100.0 |

42% patients had no kind of cardiac problem and Right Axis deviation was found on ECG 15.0% participants.

Table VI: Echo Findings and Fitness for anesthesia

| Diagnosis | Frequency | Percentage |
|------------------|-----------|------------|
| Good LV function | 800 | 80.00 |
| LV dysfunction | 200 | 20.00 |
| Total | 1000 | 100.00 |

Table VII: Fitness of Anesthesia

| PACU Decision | Frequency | Percentage |
|---------------------|-----------|------------|
| Fit for operation | 973 | 97.30 |
| Unfit for operation | 27 | 2.70 |
| | 1000 | 100.00 |

However, after Eco-cardiography good LV function was found in 80% cases and most of the patients, 973(97.3%) were finally opined as ‘fit for operation’. 2.7% patients were made ‘unfit for operation’.

Discussion

It is estimated that 90% of CVDs are preventable.⁴ Prevention of atherosclerosis involves improving risk factors through healthy eating, exercise, avoidance of tobacco smoking and limiting alcohol intake.¹ Treating risk factors, such as high blood pressure, blood

lipids and diabetes is also beneficial.¹ Treating people who have streptococcal throat infection with antibiotics can decrease the risk of rheumatic heart disease.⁵ The use of aspirin in people, who are otherwise healthy, is of unclear benefit.^{6,7} Cardiovascular diseases are the leading cause of death globally.¹ This is true in all areas of the world except Africa.¹ Together they resulted in 17.9 million deaths (32.1%) in 2015, up from 12.3 million (25.8%) in 1990.^{3,2} Deaths at a given age, from CVD are more common and have been increasing in much of the developing world, while rates have declined in most of the developed world since the 1970s.^{8,9} Coronary artery disease and stroke account for 80% of CVD deaths in males and 75% of CVD deaths in females.¹ Most cardiovascular disease affects older adults. In the United States 11% of people between 20 to 40 years of age have CVD, while 37% between 40 to 60, 71% of people between 60 to 80, and 85% of people over 80 have CVD.¹ The average age of death from coronary artery disease in the developed world is around 80 while it is around 68 in the developing world.¹ Disease onset is typically seven to ten years earlier in men as compared to women.¹⁰ There are many risk factors for heart diseases like age, gender, tobacco use, physical inactivity, excessive alcohol consumption, unhealthy diet, obesity, genetic predisposition and family history of cardiovascular disease, raised blood pressure (hypertension), raised blood sugar (diabetes mellitus), raised blood cholesterol (hyperlipidemia), undiagnosed celiac disease, psychosocial factors, poverty and low educational status, and air pollution.¹¹⁻¹⁶ While the individual contribution of each risk factor varies between different communities or ethnic groups the overall contribution of these risk factors is very consistent.¹⁷ Some of these risk factors, such as age, gender or family history/genetic predisposition, are immutable. However, many important cardiovascular risk factors are

modifiable by lifestyle change, social change, drug treatment (for example prevention of hypertension, hyperlipidemia, and diabetes).¹⁸ People with obesity are at increased risk of atherosclerosis of the coronary arteries.¹⁹ This retrospective cross-sectional analytical study was carried out in the orthopedic inpatient department of NITOR for one year (July 2015 - June 2016) among patients aged more than 18 years of age with clinically and radiologically proved as orthopedic problems to see the incidental ECG and Echo findings among patients who underwent elective operation which included review of documents.

One third patients were included from Dhaka divisions among which the patients, (57%) were male and (43%) were female. During record review we found (21.2%) were in the age group of more than 60 years followed by 41-50 years (19.2%) and below year was (14.4%). Most of the participants 116 (23.2%) were laborer, followed by housewife 102 (20.4%). Regarding religion, Muslims were 387 (77.4%), Hindu were 101 (20.2%), Buddhist and Christians 1.2% were each.. Among the participants, 192 (38.4%) were married whereas 18.0% were unmarried, 19.2% widow, 15.2% widower and 9.2% were separated. According to socioeconomic condition, maximum participants 246 (49.2%), 184 (36.8%) and 14.0% were low, medium and high respectively. Among the Participants, 21.2% had \leq 10,000 Tk., 19.2% had 10,001-20,000 Tk. and 18.4% had 30,001-40,000 Tk. for their monthly family income. Regarding residential status of participants, 52.2% were urban and 47.8% were rural. According to history of past illness, 40.0% had COPD, 12.8% had DM, 11.6% had HTN, 8.8% had CVD, 2.0% had TB and 1.6% CKD, whereas 23.2% had no significant disease in past. Maximum (75.2%) participants visited hospital previously. Most of the patient, 51.1%, had been suffering from cardiovascular diseases which were diagnosed during PACU. These included LVF 10.0%,

Hypertensive Heart disease 8.9%, Cerebrovascular diseases 8.5%, Endocarditis 6.7%, Peripheral vascular diseases 6.0%, Coronary Artery diseases 5.0% among other. ECG finding shows some sort of cardiac abnormality in 58% of participants which includes Right Axis Deviation 15.0%, Hypokalemia 12.8%, WPW syndrome 11.6%, Right Ventricular Hypertrophy (RVH) 8.8%. However Echocardiography shows good Left Ventricular function in 80% of cases and finally 97.3% of patients were 'fit for operation' and only 2.7% were denied for operation.

Our study has limitations. First, it has a retrospective design, that imply the lack of important clinical variables such as systemic factors causing atherosclerosis (e.g., diabetes mellitus, hypertension, dyslipidemia, smoking, etc.). Second, we did not perform patient's follow-up; thus, no conclusion may be drawn on the progression and clinical relevance of Incidental Cardiac Finding (ICF). Third, as mentioned above, we cannot exclude that at least a part of the missing ICFs were actually detected by the original radiologists but considered as not clinically relevant. At any rate, our data are in line with those already published by other authors.

Conclusion

Incidental finding of ECG shows 58% had some kind of cardiac problem. As some of these findings may be of clinical value, general health screening should pay more attention to the heart which may play an important role in early diagnosis and management of cardiac problems. High rate of ICF in this small cross sectional study strongly recommends large scale study regarding prevalence of incidental cardiac abnormality in apparently healthy population.

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