Original Paper

ATHEROSCLEROTIC CHANGES IN CORONARY ARTERIES IN THE DECEASED SOLDIERS DIED OF NON CARDIAC CAUSES

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Abstract

Introduction: Myocardial infarction is a leading cause of death in western world and also in underdeveloped countries like Bangladesh. Myocardial infarction is mostly caused by atherosclerotic changes in coronary blood vessels. A study was carried out to find out atherosclerotic changes in coronary arteries in the deceased died of non cardiac causes.

Methods: The study was carried out at AFIP, Dhaka Cantonment over 07 yrs during the period from January 2003 to December 2010. Among all autopsy cases received during the stipulated time the deceased died of non cardiac causes and not confirmed to be of cardiac causes were included in the study. Atherosclerosis was searched in left anterior descending artery (LAD), left circumflex branch of left coronary artery and right coronary artery.

Results: Among total 258 autopsy specimen 41 (15.89%) were found with definite cardiac cause of death. Rest 217 cases were included in the study. All the deceased were soldiers of Bangladesh Army with the age range from 27 yrs to 54 yrs. Atherosclerosis was found in 51 (23.50%) cases. Among 51 atherosclerosis cases 50 (98.03%) were found in left anterior descending coronary artery, 12 (23.52%) were found in left circumflex coronary artery and 05 (9.80%) were found in right coronary artery. In 8 (15.68%), >90% of vascular lumen obstruction was observed. Six (11.76%) were found with 81%-90% obliteration, 31 (60.78%) were found with 50 to 80% obliteration and 5 (9.80%) were found with less than 50% obliteration. Almost all the cases were having calcification in the atherosclerotic plaque.

Conclusion: Despite regular physical exercise of the soldiers, atherosclerosis is not very uncommon in coronary vessels, so they remain in risk for acute myocardial infarction.

Key-words: Atherosclerosis, coronary arteries, sudden cardiac death

Introduction: Ischemic heart disease is the leading cause of death world wide for both men and women (7 million total per year)[1]. Every year more than one million people in the United State and more than nineteen million worldwide, experience a sudden cardiac event (acute coronary syndromes and/or sudden cardiac death). Sudden cardiac death (SCD) is an unexpected death due to cardiac cause occurring in a short time period (generally within one hour of symptom onset) in a person with known or unknown cardiac disease in whom no previously diagnosed fatal condition is apparent[2]. In more than 90% of cases, the cause of myocardial ischemia is reduced blood flow due to obstructive atherosclerotic lesions in coronary arteries.

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In addition to coronary atherosclerosis, myocardial ischemia may be caused by coronary emboli, blockage of small coronary vessels, and lowered systemic blood pressure[1]. Coronary Artery Disease (CAD) affects the Indian population at a younger age than in other ethnic groups with more severe and extensive angiographic involvement[3]. Epidemiological studies performed in last 50 years have revealed that there is a significant rise in prevalence of coronary artery disease in urban as well as in rural Indian population and CAD has been predicted to assume epidemic proportions in India by the year 2015 [4].

Atherosclerotic plaques particularly prone to rupture, so- called vulnerable plaque, are pivotal in the genesis of acute coronary syndromes[5]. Vulnerable plaque is particularly prone to produce sudden major problems, such as a heart attack or stroke. These plaques are at increased risk of disruption leading to thrombus formation and

have a higher likelihood of rupture leading to a major acute coronary event. Rupture of vulnerable plaques is the main cause of acute coronary syndrome and myocardial infarction. Identification of vulnerable plaque is, therefore, essential to enable the development of appropriate treatment modalities[6].

So far no such study has been performed to find out the incidence and pattern of atherosclerotic changes in Bangladeshi population. The present study is designed to assess the incidence and patterns of atheroma formation in coronary vessels in the Bangladeshi soldiers who died of non-cardiac causes

Methods: The study was carried out at AFIP, Dhaka Cantonment over 07 yrs during the period from January 2003 to December 2010. During the stipulated time, autopsy specimen of deceased soldiers died of non cardiac causes received at AFIP, Dhaka Cantonment from different military hospitals of Bangladesh were included in the study. Inclusion criteria:

a) Autopsy specimen of deceased soldiers clinically not known to be hypertensive or having any other known cardiac disease.
b) Autopsy specimen of deceased soldiers who were not histologically diagnosed as having myocardial infarction or myocarditis or cardiac hypertrophy or cardiomyopathy.
c) Only coronary vessel changes were not considered as cardiac disease.
d) Autopsy specimen containing whole heart was only considered for the study. In some cases part of heart was received, those cases were not included in the study.

Before autopsy, written consent were taken from close relatives of the deceased as well as from head of the institute of the deceased.

On gross examination of heart, cardiac chambers, cardiac wall, septum, cardiac valves were examined to exclude any congenital deformity, cardiac hypertrophy, cardiomyopathy and rheumatic heart disease. Grossly atherosclerosis was searched in left anterior descending (LAD) coronary artery, left circumflex branch of left coronary(LCx) artery and right coronary (RC). artery Representative sections were taken from visible atherosclerotic plaque or from initial 1 cm of LAD, LCx and RC artery. To exclude MI, myocarditis or any other myocardial diseases sections were taken from myocardial wall from apex of the heart, anterior surface and inferior surface. Sections taken from vessels and cardiac wall were processed following the standard routine (paraffin) method and were examined histologically after H&E staining.

Results: During the period of 07 years from January 2003 to December 2007,a total 258 autopsy specimen were received at histopathology department of AFIP, Dhaka Cantonment

Among total 258 autopsy specimen 41 (15.89%) were found with definite cardiac cause of death. Rest 217 cases were included in the study. All the deceased included in the study were male soldiers of Bangladesh Armed Forces with the age range from 27 yrs to 54 yrs with the mean age 34.22+ 19.78 yrs.

Among 217 deceased, 82 died of road traffic accident (RTA), 09 from cerebral malaria, 10 from different malignant diseases, 25 from unnatural medico legal causes, 11 from other known medical causes and 80 from unknown causes (Fig- 1).

Among 217 deceased, atherosclerotic changes were found in at least one of the examined coronary vessels in 51 (23.50%) cases (Fig.-2). Most (21- 41.18%) of the deceased belonged to 3rd decade. Mean age of the deceased was 36.27+ 17.73 yrs. Age distribution is shown in (Fig-3).

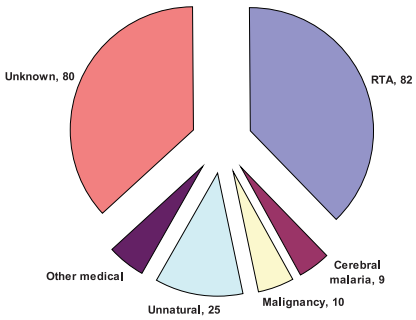

Fig-1: Cause of death of the deceased included in the study (n=217).

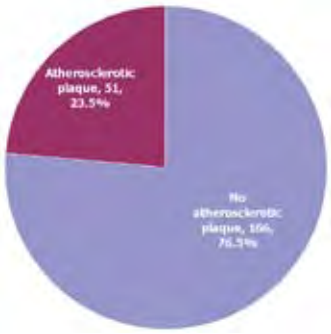

Fig-2: Atherosclerotic changes in coronary arteries (n=217)

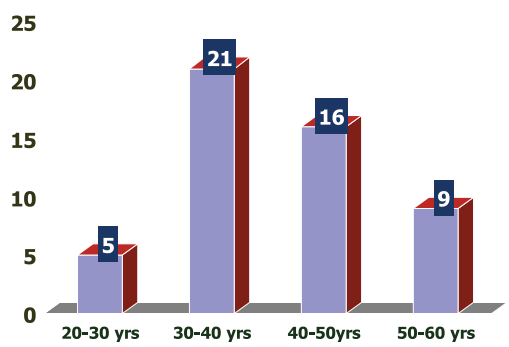

Fig-3: Age distribution of deceased having coronary atherosclerosis (n=51)

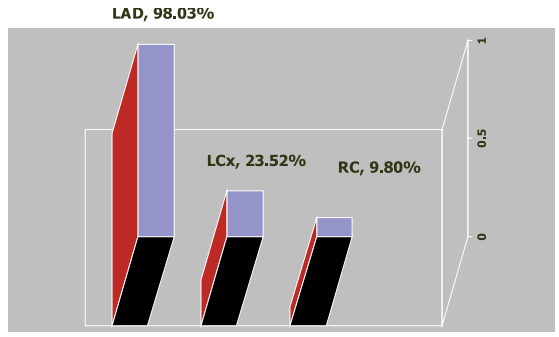

Fig-4: Atherosclerosis in different coronary arteries (n=51)

Among 51 atherosclerosis cases 50 (98.03%) were found in left anterior descending coronary artery, 12 (23.52%) were found in left circumflex coronary artery and 05 (9.80%) were found in right coronary artery (Fig.-4). In 39 (76.47%) only LAD and in 01 case only LCx was involved. In 06 (11.76%) cases both LAD and LCx were involved. In 05 (9.80%) cases all three vessels were involved. Among 51 cases, 90% obliteration was observed in 8 (15.68%) cases. Six (11.76%) were found with 81-90% obliteration, 31 (60.78%) were found with 50 to 80% obliteration and 5 (9.80%) were found with less than 50% obliteration. Almost all the cases were having calcification in the atherosclerotic plaque.

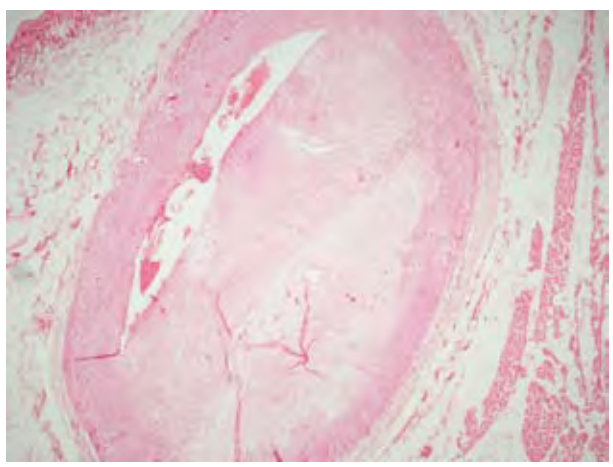

Fig-5: Coronary atherosclerosis occluding about 85%.

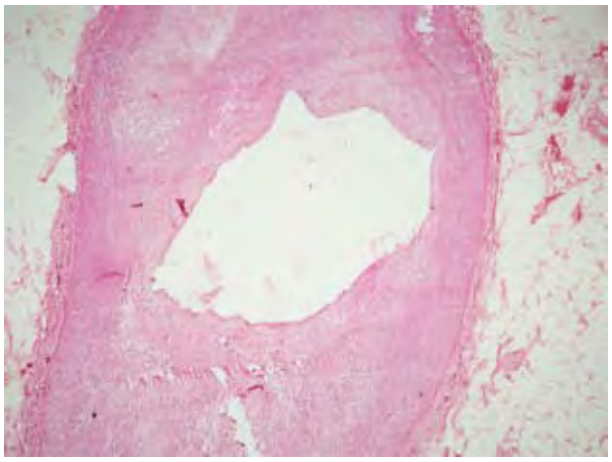

Fig-6: Coronary atherosclerosis occluding >50%.

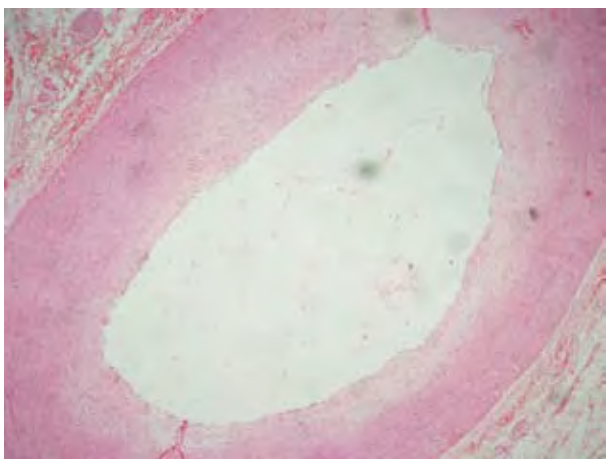

Fig-7: Coronary atherosclerosis occluding <50%.

Discussion: Atherosclerosis is a common phenomenon, which is seen with various prevalence in different races. According to its definition, it is a disease of elastic vessels (aorta, carotid, iliac, coronary, etc). yet the vessels of some organs such as heart, brain and kidneys are considered to be the primary targets of atherosclerosis due to their special susceptibility[1]. Atherosclerosis of coronary arteries and myocardial infarction are the most common fatal cardiac diseases found in autopsies[7]. Coronary atherosclerosis is the most frequent cause of ischemic heart disease. The composition and vulnerability of the atherosclerotic plaque determines the development of acute coronary syndromes[8]. Besides some non modifiable risk factors like male gender, increasing age, family history and genetic susceptibility, some modifiable factors are described by Framingham heart study group like hypertension, diabetes mellitus, hyperlipidaemia, cigarette smoking and increased C-reactive protein[9].

Conclusions based on autopsy studies about the incidence of a disease in the population are subject to bias from various sources[10]. In our study all the study population is of single gender group that is male soldiers with the age range from 27 to 54 years with the mean age of 34.22+ 19.78 yrs. While in an Indian study at Madras, age of autopsy population were ranged from 6 to 94 irrespective of sexes[11]. Another study at Isfahan included the autopsy specimen with age range from 15 to 50 yrs including both male and female[12]. In our study we could include only the men, because the institute deals only with the autopsy specimen of Bangladesh Army. Bangladesh Army recruits women soldiers only in officer category and during the study period no autopsy specimen among the lady officers was received. Family history and genetic susceptibility could not be evaluated in the study. Due to strict health care management system no known hypertensive or diabetic soldier was included in the study. Lipid status, cigarette smoking habit and C-reactive protein status of the deceased soldiers also could not be evaluated.

In our study the frequency of atherosclerosis was 23.50% which is closer to the similar studies. Golshahi et al at Isfahan, Iran found 31.1% incidence in male among the autopsy specimen of general population[12]. In Pakistan two studies found frequency of atherosclerosis in 26.9% and 23.75% respectively[13]. While Kulangara AC et al found frequency of coronary sclerosis ranging from 12% during 2nd decade, 23% in 3rd decade to 100% during 6th decade[11]. In the studies done on different age groups, the frequency of these lesions were reported between 16% to 75% [14,15].

In our study left anterior descending artery involvement was found in almost all cases except one (98.03%). Among 51 cases single vessel involvement was the commonest.

In 39 (76.47%) only Left Anterior Descending coronary artery was involved while in 01 case only Left Circumflex coronary artery was involved. In 06 (11.76%) cases both LAD and LCx were involved. In 05 (9.80%) cases all three vessels were involved. Virmani et al studied 48 autopsy patients younger than 30 years who had severe coronary atherosclerosis and showed that single-vessel disease (44%) was greater than the others. Also they noted that left anterior descending was the most commonly involved artery like our findings[16]. While Yazdi SAT et al at Iran found three vessel involvement was the commonest though they also found left anterior descending artery to be the most commonly involved vessel (60%)[17].

In our study we got >90% vascular occlusion in 8 (15.68%) cases. Six (11.76%) were found with more than 80% obliteration, 31 (60.78%) were found with 50 to 80% obliteration and 5 (9.80%) were found with less than 50% obliteration. Almost all the cases were having calcification in the atherosclerotic plaque. Joseph A et al found > 50% narrowing in 20.7% and > 75% narrowing in 9%[15].

Conclusion: Despite regular physical exercise of the soldiers, atherosclerosis is not very uncommon in coronary vessels, so the soldiers remain in risk for acute myocardial infarction. To know the trend of atherosclerosis in coronary vessels in general population of Bangladesh, a country wide study is needed.

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