A Study of Atherosclerosis in Autopsy Cases

[1]Megha Sharma, Senior Demonstrator, Department of Pathology, Government Medical College, Jammu

[2]Subash Bhardawaj, Professor and head of Department, Department of Pathology, Government Medical College, Jammu

Corresponding Author: Megha Sharma, Senior Demonstrator, Department of Pathology, Government Medical College, Jammu

Abstract

Introduction: Atherosclerosis is a pathological entity and a multifactorial disease of large and medium sized arteries. 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. The prevalence of coronary artery disease (CAD) among Asian Indians is higher than among Europeans, Americans and other Asians. Autopsy is a tool of real value for assessment of pathologies, which are difficult to assess in the living.So, autopsy plays a major role in documenting the prevalence of atherosclerosis in the population.

Aim: The study was done to see the prevalence of atheroscleroticlesions in autopsy specimens of heart and to correlate with age and sex and the lesions were also graded according toAmerican Heart Association Criteria for Grading.

Material And Method: This study was conducted for a period of six months i.e from December 2019 to May 2020 in dept of Pathology GMC Jammu on the received specimens of heart obtained from mediolegal autopsy cases .The revelent information regarding age,sex and other comorbties was noted down.The excised heart specimens were fixed in 10% formalin.A detailed gross examination of heart including major vessels,coronary arteries and their branches was carried out and sections were taken. Detailed microscopic examination was done to look for presence atherosclerosis changes and graded according to the American Heart Association Classification.

Result: Out of 126 heart specimens,50 specimens showed atherosclerotic changes,frequency being 39.6%. Atheromatous plaques were observed in 43.9 % of the males and   31.8 % of the female heart specimens. The most common age group for atherosclerotic changes was 40-50 yrs with 42% of the total cases,followed by 30-40 age group with 22% of the total cases.The least no of cases were found in 10-20 age group with only 1 case. The most frequently involved branches in order of frequency were left anterior descending (48%), left coronary artery (34.6%), right coronary artery (12.2%) and left circumflex artery (5.2%). Microscopic examination showed,26 cases(52%) having Grade 3 lesion followed by 11 cases(22%) showing Grade 1 lesion.8 cases(16%) depicted Grade 4 lesion while Grade 3 lesion was appericated in 5 cases(10%).

Conclusion: Cardiovascular disease remains a major cause of mortatity and morbidity in today's world and atherosclerosis is one of main cause for cardiovascular related deaths. This study reflects that the preventive measures, screening of cardiovascular risk factors, lifestyle modifications should be instituted early in the third decades of life.

Keywords: Atherosclerosis, Autopsy.

Introduction

Atherosclerosis is a pathological entity and a multifactorial disease of large and medium sized arteries,characterised by plaque like intimal deposits which contain neutral fats, cholesterol, lipophages, blood elements, at times haemorrhage and calcification[1]. According to its definition, it is a disease of elastic vessels (aorta, carotid, iliac,coronary, etc) [2].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[2]

Different agents such as age,[3,4] race,[3,4] smoking,[4] weight,[4,5,6] and dyslipidemia [4,6,7,8] are mentioned as risk factors for atherosclerotic lesions of coronary arteries.

The prevalence of coronary artery disease (CAD) among Asian Indians is higher than among Europeans, Americans and other Asians. Many studies infer that the case load of CAD in India is alarming. According to the World Health Report 2002, 45 million people in India are suffering from CAD and it is contributing to one fifth of the deaths in India and also, by the year 2020, CAD will account for one third of all deaths.The heart disease in Indian population occurs 10 to 15 years earlier than in the western people

Autopsy is a tool of real value for assessment of pathologies, which are difficult to assess in the living [9]. As study of atherosclerosis in the living population is difficult, invasive and expensive especially in developing countries, autopsy plays a major role in documenting the prevalence of atherosclerosis in the population [10]. Atherosclerosis of coronary arteries and myocardial infarction are the most common fatal cardiac diseases found in autopsies.

The study was done to see the prevalence of atheroscleroticlesions in autopsy specimens of heart and to correlate with age and sex and the lesions were also graded according toAmerican Heart Association Criteria for Grading.

Material and Method

This study was conducted in dept of Pathology GMC Jammuon the received specimens of heart obtained from mediolegal autopsy cases during a period of six months from December 2019 to May 2020.The revelent information regarding age,sex and other comorbities was noted down.The excised heart specimens were fixed in 10% formalin.A detailed gross examination of heart was carried out including major vessels,coronary arteries and their branches for presence of fatty streaks,plaques or occlusion.

Sections were taken from right coronary,left coronary,left anterior descending artery and left circumflex artery.After processing,embedding,3-5 micron sections were cut and stained with H &E stain. Detailed microscopic examination was done to look for presence atherosclerosis changes and graded according to the American Heart Association Classification.

American Heart Association Criteria for Grading Atherosclerotic Lesions -

Grade 1 - Isolated intimal foamy cells (minimal change).

Grade 2 - Numerous intimal foamy cells often in layers (fatty streaks).

Grade 3 - Pools of extra cellular lipid without a welldefined

core (intermediate lesion or pre-atheroma).

Grade 4 - Well defined lipid core with luminal surface covered by normal intima (atheroma or fibroplaque).

Grade 5 - Lipid core with a fibrous cap with or without calcification (fibroatheroma).

Grade 6 - Fibroatheroma with cap defect such as hemorrhage and thrombosis.

Grade 7 - Calcification prominent.

Grade 8 - Fibrous tissue change prominent.

Results

Out of 126 heart specimens, 50 specimens showed atherosclerotic changes, frequency being 39.6%. Athermanous plaques were observed in 43.9 % of the males and 31.8 % of the female heart specimens.

	Total Cases	Atheroma Cases
Males	82	36(43.9%)
Females	44	14(31.8%)
	126	50

Age Wise Distribution

Age Group	No of Cases
10-20 yrs	1(2%)
20-30 yrs	8(16%)
30-40 yrs	11(22%)
40-50 yrs	21(42%)
50-60 yrs	9(8%)
TOTAL	50

The most common age group for atherosclerotic changes was 40-50 yrs with 42% of the total cases,followed by 30-40 age group with 22% of the total cases.The least no of cases were found in 10-20 age group with only 1 case.

The most frequently involved branches in order of frequency were left anterior descending(48%),left

coronary artery (34.6%),right coronary artery (12.2%) and left circumflex artery (5.2%).

Arteries Involved	Percentage
Left anterior descending artery	48%
Left coronary artery	34.6%
Right coronary artery	12.2%
Left circumflex artery	5.2%

Microscopic examination showed,26 cases(52%) having Grade 3 lesion followed by 11 cases(22%) showing Grade 1 lesion.8 cases(16%) depicted Grade 4 lesion while Grade 3 lesion was appericated in 5 cases(10%).

Out of 50 cases, 17 cases(34%) showed more than single vessel involvement.

Discussion

The autopsy study provides a means of understanding the basic process which sets a stage for clinically significant atherosclerotic cardiovascular disease. There is no valid method of sampling of living population. It was, therefore, considered that death suspected due to cardiovascular pathology, probably provide the best sample of the living population for studying atherosclerosis.

In the present study, out of 126 heart specimens,50 specimens showed atherosclerotic changes,frequency being 39.6% . The frequency of atherosclerotic lesions was 28.9% in a study conducted by Golshadi MD et al [11] The results of our study also corresponded to the results of similar studies [3,12,13,14]

In the present study, atheromatous plaques were observed in 43.9 % of the males and 31.8 % of the female heart specimens which are concordant with the study of Thej et al. which showed 62 % males & 50 % females in Indian population. Study reported by Yazdi SAT et al., showed 73 % males and 61 % females had atherosclerosis in a population of Iran. This difference

is again explained by the demographic, geographic, racial, lifestyle & dietary variation in population Singh H et al., have reported the incidence of atherosclerosis in the coronaries to be 68 % in males and 27 % in females.

Atheroscelorotic lesions start early in life and gradually increase with increasing age.In the present study,the most common age group for atherosclerotic changes was 40-45 yrs with 42% of the total cases,followed by 30-40 age group with 22% of the total cases.The least no of cases were found in 10-20 age group with only 1 case. The results of the present study are comparable to those shown by Agravat AH et al and Garg M et al who also observed significant atheroma in the third decade and thereafter increased gradually in both their frequency and severity (18,19). Earlier studies in India by Wig KL et al found significant atheroma in two-third of cases above age 20 and maximum incidence in sixth decade (89.5%) (20). Tandon OP et al found atherosclerosis in second and third decade(21).This increase in frequency after the second decade of life is related to modifiable life style risk factors.

Incidence of left anterior descending artery involvement was 48%,left coronary artery was 34.6%,right coronary artery 12.2% and lrft circumflex artery was5.2%. This was in concordance with the data given by Sudha et al who showed Left Anterior Descending Artery as the most common site for plaque (47%) and Yazdi et al who showed Left Anterior Descending Artery as the most commonly involved artery (60%) followed by Right Coronary Artery (50%) and Left Circumflex Artery (42.5%) (22,23)

Conclusion

Cardiovascular disease remains a major cause of mortatity and morbitity in todays world and atherosclerosis is one of main cause for cardiovascular

related deaths.In the present study,the prevalence of atherosclerosis was higher in males as compared to females with majority of cases seen in fourth decade of life followed by third decade of life showing increasing prevalence with increasing age. This reflects that the preventive measures, screening of cardiovascular risk factors, lifestyle modifications should be instituted early in the third decades of life.

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