

Coronary Artery Atherosclerosis-An Autopsy Study

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Conflicts of Interest: Nil.

Abstract

Introduction

Atherosclerosis is characterised by intimal lesions called atheromas or atheromatous plaques or fibrofatty plaques in large and medium sized arteries ; that protrude into and obstruct the vascular lumen. In order to assess the magnitude of the problem, a retrospective study of autopsied patients for the presence of atherosclerotic lesions of the coronary arteries was undertaken for a period of 2 years in the pathology department of Government Medical College Jammu.

Result

Out of 250 cases, 145 cases(58%) showed various atherosclerotic changes in coronaries.The age varied from 19 years to 85 years. Overall ,atherosclerosis was seen having highest prevalence in older patients and males patients were affected more than female patients. Out of 3 major coronaries Left anterior descending artery was the most commonly involved . Most common atherosclerosis lesion was Type V lesion followed by Type III (preatheroma) lesion .

Conclusion

This study showed the prevalence of atherosclerosis among the autopsy cases. Since incidence seems to be increasing with age so there is need for lifestyle changes in general public and also calls for screening programmes and prevention and control measures from an early age .

Keywords: Atherosclerosis, artery, coronaries.

Introduction

The disease atherosclerosis has great relevance today . It is a distinctive form of arteriosclerosis known from ancient times. The term “athere” means (porridge) sclerotic (hardening or fibrosis) and is derived from greek terminology(1) . It is characterised by intimal lesions called atheromas or atheromatous plaques or fibrofatty plaque (contain neutral fats,cholesterol,lipophages,blood elements at times other evidence of haemorrhage and calcium deposits)in large and medium sized arteries ; that protrude into and obstruct the vascular lumen and also weakens the underlying media(2). Complications of plaque are Ischaemic heart disease, Cerebral Stroke, Peripheral gangrene and so on. Coronary artery disease due to atherosclerosis is epidemic in India.An estimated 1.3 million Indians died from this in 2000(3). In order to assess the magnitude of the problem ,a retrospective study of autopsied patients for the presence of atherosclerotic lesions of the coronary artery was undertaken for a period of 2 years from June 2015 to June 2016 in the Government Medical College Jammu.

Materials and Methods

This study is based on autopsy cases whose heart specimens were received in the pathology department of Government Medical College.The heart specimens were subjected to histopathological examination.Gross as well as microscopic examination of cardiac specimens was

done to study the atherosclerotic changes. Autolysed specimens were excluded from the study. On receiving specimens were immediately fixed in 10% formalin solution. A detailed gross examination was done. Heart was dissected by inflow outflow method. The coronaries were dissected. Each coronary was sectioned with multiple cuts with scalpel at 1cm intervals to see gross findings of obstruction or calcification. Aorta was also examined. Routine processing was done for the sections. Section was cut using routine rotary microtome having 3.5mm to 4mm in thickness. Haematoxylin and eosin sections were subjected for histopathological examination. Light microscopic findings like atheroma, plaque were noted.

American Heart Association criteria was utilized for grading the atherosclerotic lesion as follows(4)

Type 1-Isolated intimal foamy cell (minimal change)

Type 2-Numerous intimal foamy cells often in layers (Fatty streaks)

Type 3-Pools of extracellular lipids without a well defined core (intermediate or preatheroma)

Type 4-Well defined lipid core with luminal surface covered by normal intima (atheroma)

Type 5 Lipid core with a fibrous cap with or without calcification

Type 6 Fibroatheroma with cap defect (haemorrhage or thrombosis)

Type 7 Calcification is prominent

Type 8 Fibrous tissue change prominent

The stenosis of coronaries was graded on the luminal narrowing of the coronaries and graded as (5)

Grade 0 Normal

Grade I Artery appeared grossly normal but had microscopic findings of atherosclerosis with 1-25% stenosis

Grade II Thickening of vessel wall with 26-50% stenosis of lumen

Grade III Thickening of vessel wall with 51-75% stenosis of lumen

Grade IV Thickening and calcification with 76-100% stenosis of lumen.

Result

The coronary arteries of 250 autopsy cases whose heart specimens were received in our department were studied. Grossly measurements of right and left ventricular wall, mitral tricuspid, pulmonary and aortic wall were in normal limits. The weight of the heart was determined to be 275 ± 70 grams for males and 220 ± 55 grams for females. All the cases were divided into age group according to age at death shown in Table 1. Out of 250 cases, 145 cases (58%) showed various atherosclerotic changes in coronaries. The youngest subject was 19 years and the oldest was 85 years. Overall, atherosclerosis was seen having highest prevalence in older patients after 5th decade. It was followed by age group 41 to 50 years, 31 to 40 years, 21-30 years and least in younger age group shown in table 2.

In our study males 137/145 (94%) were affected more than female patients 8/145 (6%).

Out of three major coronaries Left anterior descending artery (40%) was the most commonly involved followed by Left coronary artery (36%) and Right coronary artery (33%). Left circumflex artery was the least commonly involved.

Single vessel involvement was seen in 20% while two vessel and three vessel involvement was seen in 36% and 44% cases. Three vessel involvement was the most common in our study.

In our study commonest prevalent lesion was Atheroma Type V lesion seen in 75 patients followed by Type III (preatheroma) lesion seen in 43 patients. Type IV plaque

were seen in 12 cases, Type VI in 8 cases and 3 cases each of Type VII and Type II. Out of 145 patients with coronaries involved by atherosclerosis, Grade II stenosis of coronaries was seen in 40% cases, followed by grade I seen in 28%, Grade III in 23% cases and Grade 4 in 9% cases.

Discussion

The coronary arteries of 250 autopsy cases whose heart specimens were received in our department were studied. All the cases were divided into age group according to age at death shown in Table 1. Out of 250 cases, 145 cases (58%) showed various atherosclerotic changes in coronaries. Yazdi et al (6) and Gohil M et al (7) found incidence of atherosclerosis to be 40% and 48.48% respectively comparable to our study.

The youngest subject was 19 years and the oldest was 85 years. Overall, atherosclerosis is having highest prevalence in older patients after 5th decade. All patients more than 60 years showed involvement of coronaries. It was followed by age group 41 to 50 years, 31 to 40 years, 21-30 years and least in younger age group shown in table 2. Prabhu M H et al (8) found highest prevalence after 5th decade with all cases above 60 years showing atherosclerosis as seen in our study with least number of cases recorded in patients younger than 20 years.

In our study males 137/145 (94%) were affected more than female patients 8/145 (6%). Singh et al (9) also found male patients (85%) to be more involved as compared to female patients (15%). The reason being males are bread earners and females usually do household work which makes the males more vulnerable to accidents, violence and stress. Also males indulge more in smoking, alcoholism etc.

Out of 3 major coronaries Left anterior descending artery (40%) was the most commonly involved. Sudha et al (10) and Gohil M et al (7) found the similar results. It was

followed by Left coronary artery (36%) and Right coronary artery (33%). Left circumflex artery was the least commonly involved.

Single vessel involvement was seen in 20% while two vessel and three vessel involvement was seen in 36% and 44% cases. Three vessel involvement was the most common in our study. This was comparable to study done by Porwal V et al (11) wherein three vessel disease was the most common seen in 40% followed by double vessel disease (37%) and single vessel disease (15%).

In our study commonest prevalent lesion was Atheroma Type V lesion seen in 75 patients followed by Type III (preatheroma) lesion seen in 43 patients. Type IV plaque were seen in 12 cases, Type VI in 8 cases and 3 cases each of Type VII and Type II. Sharma S et al (5) also found type V lesions to be the most common. However Dhruv et al (12) found Type IV lesions to be the most common and Porwal V et al (11) found Type III lesion to be most common in his study.

Conclusion

This study showed the prevalence of atherosclerosis among the autopsy cases. Since incidence seems to be increasing with age so there is need for lifestyle changes in general public and also calls for screening programmes and prevention and control measures from early age.

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Table 1-Age and Sex distribution of 250 autopsied cases

Age (years)	Total no. of autopsy cases (250)	Male Total 220 (88%)	Female Total 30 (12%)	Percentage (%)
11-20	12	8	4	4.8%
21-30	48	35	13	19.2%
31-40	65	60	5	26%
41-50	67	62	5	26.8%
51-60	40	39	1	16%
61-70	11	10	1	4.4%
>70	7	6	1	2.8%
Total	250	220	30	100

Table 2 –Prevalence of atherosclerosis in different age group

Age (years)	Total no. of autopsy cases (250)	Cases having atherosclerosis (145)	Percentage (%)
11-20	12	1	8.3 %
21-30	48	14	29 %
31-40	65	35	53.8 %
41-50	67	42	62.6 %
51-60	40	35	87.5 %
61-70	11	11	100 %
>70	7	7	100 %

Table 3 Frequency of atherosclerosis in three major coronaries

Name of artery	Total No. of cases having atherosclerosis (145)	Percentage (%)
Right coronary artery	58	40%
Left coronary artery	52	36%
Left anterior descending artery	47	33%

Table 4 Type of atherosclerotic plaque seen

	Type I	Type II	Type III	Type IV	Type V	Type VI	Type VII	Type VIII
No. of cases (145)	1	3	43	12	75	8	3	-
Percentage (%)	0.6%	2%	29.6%	8.2%	51.7%	5.5%	2%	-

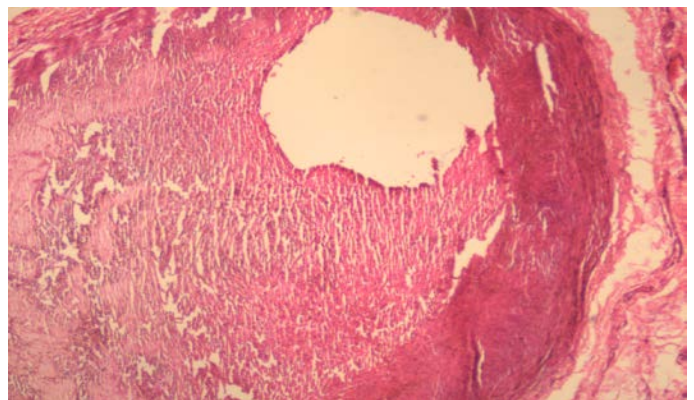


FIG1-Photomicrograph showing Atheromatous plaque with 75% of luminal narrowing.

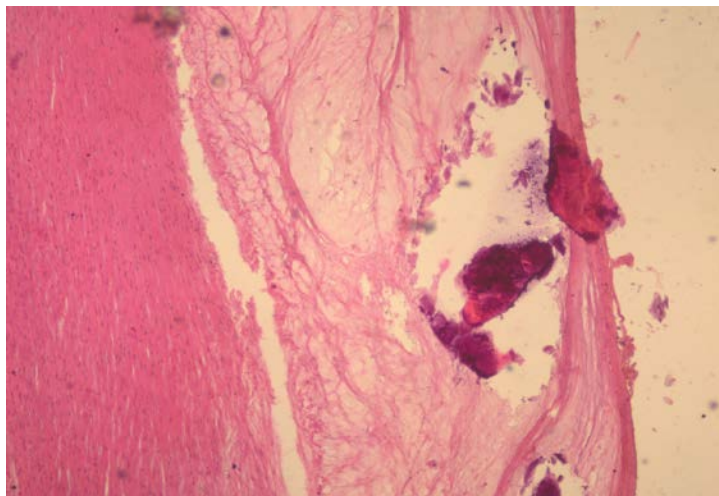


FIG 2-Photomicrograph showing Atheromatous Plaque with calcification.