



AN AUTOPSY STUDY OF MORPHOLOGIC PARAMETERS OF CORONARY ARTERIES IN ATHEROSCLEROSIS.

Pathology

Dr. Khiste J. A. Assistant Professor, Dept of Pathology, Dr V.M.G.M.C, Solapur

Dr. Kurdukar M. D. Associate Professor, Dept of Pathology, Dr V.M.G.M.C, Solapur

Dr. Pandit G. A. Professor and Head, Dept of Pathology, Dr V.M.G.M.C, Solapur

Dr. Kokate Priyanka S. Junior Resident III, Dept of Pathology, Dr V.M.G.M.C, Solapur.

ABSTRACT

Objective : To evaluate coronary artery atherosclerosis in autopsy cases by morphologic analysis and to grade atherosclerosis as per American Heart Association.

Methods : The present study comprised of 80 consecutive medicolegal autopsy cases received in the Department of Pathology, Solapur for histopathological examination for a period of six months. Autolysed specimens and cases where heart was not received were excluded. Representative bits were given from all heart specimens and were processed as per standard protocol. Microscopic examination of cross section of all coronaries was done for morphological grading of atherosclerosis as per the American Heart Association criteria.

Results : Females (53.75%) outnumbered males and eccentric (67.81%) type of lesion was more common than concentric. Left main coronary was the predominant vessel involved. All cases with grade 6 lesion were associated with myocardial infarction.

Conclusion : Higher grades of atherosclerosis are inevitably associated with myocardial infarction.

KEYWORDS

coronary, atherosclerosis, autopsy.

Atherosclerosis is a disease of medium sized arteries characterized by hardening of vessel wall. The term is derived from greek word 'athero' means 'gravel' and sclerosis means hardening. Atheromatous or fibrofatty plaque consists of a central lipid core covered by a fibrous cap. Atheromatous plaque protrudes in the lumen and causes obstruction to blood flow. Besides this it is responsible for acute vascular catastrophe due to complications of atheromatous plaque. Atherosclerotic coronary artery disease is the commonest cause of premature death in developed countries globally. By the year 2020 it will become the leading cause of death world wide.¹

American Heart Association is a committee on vascular disease which has proposed a numerical 6 tier classification for the grading of atherosclerosis.

The present study was undertaken to evaluate atherosclerotic coronary artery disease in autopsy cases with respect to morphologic analysis and to grade atherosclerosis as per American Heart Association grades.

Material and Methods

The present study was undertaken after approval of the Institutional Ethics Committee and it comprised of 80 consecutive medicolegal autopsy cases received in the Department of Pathology, Solapur for histopathological examination for a period of six months.

Autolysed specimens and cases where heart was not received were excluded from the study. Heart was fixed in 10% formalin. It was opened and dissected with Virchow's inflow outflow method. Right coronary artery (RCA) and left coronary artery (LCA) with its branches namely left anterior descending (LAD) and left circumflex (LCX) were identified starting at their origin from aorta transverse cuts with sharp scalpel at intervals of 2 to 3 mm were given throughout the course of the artery till they enter the musculature. The exposed arteries were examined for thickening, narrowing, atheroma, thrombus and calcification. Representative bits from pathologic areas from all the four arteries were taken and processed for paraffin embedding and hematoxylin and eosin staining as per the standard protocol. Special stain like Verhoff's stain was employed where ever necessary.

Morphological Examination of all four vessels was done and evaluated for presence of atherosclerosis and type of atherosclerotic plaque concentric or eccentric.⁵ Microscopic examination of cross section of

all coronaries was done for morphological grading of atherosclerosis as per the American Heart Association criteria.

American Heart Association criteria for grading atherosclerosis.^{2,3,4}

Grade 0: Sections showing normal histology or adaptive thickening without macrophages or foam cells.

Grade 1: Presence of isolated macrophage foam cells.

Grade 2: Intracellular lipid accumulation with formation of multiple foam cell layers.

Grade 3: Grade 2 lesions along with small extracellular lipid pools.

Grade 4: Grade 2 changes along with a core of extracellular lipid.

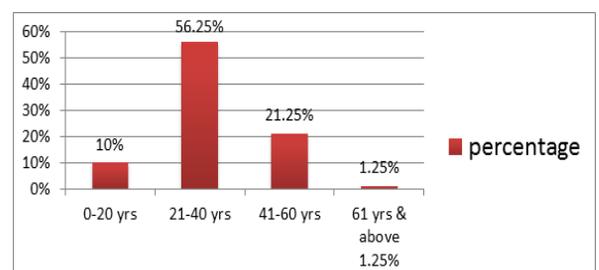
Grade 5: Lipid core and fibrotic layer or multiple lipid cores and fibrotic lipid layers.

Grade 6: Complicated plaques with surface defects, and/or hematoma-hemorrhage, and/or thrombosis

Results :

In the present study consecutive 80 heart specimens of medicolegal autopsies were studied. It was found that females 43 (53.75%) outnumbered males 37 (46.25%)

Maximum no. of cases were found in age group 21-40 years (56.25%) as depicted by the following graph.



Eccentric type (67.81%) of luminal narrowing was more common than concentric (32.18%) as depicted by following graph.

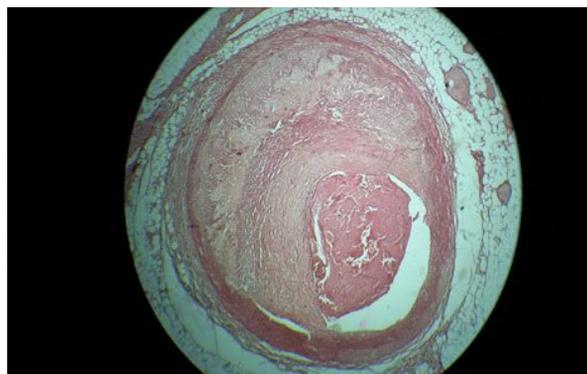
TABLE 1 : AHA grade Distribution of Atherosclerosis in Coronary Arteries

Artery		Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
RCA	No. of cases	11	22	11	20	5	11	0
	%	13.75%	27.50%	13.75%	25%	6.25%	13.75%	-
LCA	No. of cases	10	17	13	16	8	14	2
	%	12.50%	21.25%	16.25%	20%	10%	17.50%	2.5%
LAD	No. of cases	20	19	6	23	2	9	1
	%	25%	23.75%	7.5%	28.75%	2.5%	11.25%	12.5%
LCX	No. of cases	17	14	13	17	1	15	3
	%	21.25%	17.5%	16.25%	21.25%	12.50%	18.75%	3.75%
TOTAL		58 (18.12%)	72 (22.50%)	43 (13.43%)	76 (23.75%)	16 (5%)	49 (15.31%)	6 (1.87%)

Above table depicts that commonly affected artery was Left coronary sparing only 12.5% of cases. Commonest atherosclerotic change in RCA & LCA was grade 1 followed by grade 3 whereas in LAD & LCX it was grade 3 followed by grade 1.

Overall grade 6 (figure :2) type of lesion was found in 6 (1.87%) cases and all were associated with acute myocardial infarction.

Figure : 1 : Photomicrograph showing Grade 6 type of lesion : Complicated plaques with surface defects, and/or hematoma-hemorrhage, and/or thrombosis



Discussion

Atherosclerosis is a chronic immunoinflammatory, fibroproliferative disease of large and medium-sized arteries fuelled by lipid⁵. Autopsy is a tool of real value for assessment of pathologies that are difficult to assess in the living⁶.

As study of atherosclerosis in the living population is difficult, invasive, and expensive especially in developing countries, autopsy studies has been proved to be a good method for assessing atherosclerosis.⁷

The present study included 53.75% females and 46.25% males. But autopsy studies by Dhruva et al⁸, (73.6% males and 26.4% females), Puri et al⁹, (80% males and 20% females), Garg et al¹⁰, (81% males and 19% females), Thej et al¹¹, (69% males and 31% females) and Singh H et al¹², (84% males and 16% females) showed a male preponderance. This may be due to difference in the study design.

Among all major coronaries, LCA had the highest incidence of atherosclerotic involvement (87.5%) whereas in studies by Kumar et

al(68%)¹³, and Yazdi et al (60%)¹⁴, LAD was the most commonly involved artery.

In the present study, AHA Grade 1 atherosclerotic change was the most common type of atherosclerotic lesion seen in both LCA and RCA while in LAD and LCX, AHA Grade 3 atherosclerotic change was most common. But in studies by Dhruva et al⁸, and Garg et al¹⁰, the commonest type of atherosclerotic change was AHA Grade 4 and Grade 3 respectively.

Conclusion

To reduce the incidence of acute myocardial infarction and subsequent mortality rates it is imperative to restrict the progression of atherosclerosis as the present study showed that higher grades of atherosclerosis are inevitably associated with myocardial infarction.

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