Original Research Article

Study of Incidence and Severity of Coronary Arteries Stenosis in Sudden Deaths

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ABSTRACT

This study was conducted to find out incidence, risk factor and involvement of individual arteries. The present study was carried at the Department of Forensic Medicine Shri M.P.Shah Govt. Medical College, Jamnagar during the period of December 2010 to August 2012. In present study 130 sudden deaths cases were included. The heart was examined in these cases for gross and microscopic examination of arteries.LAD (24.6%) was the most common site of stenosis followed by LM (12.3%). Majority cases with microscopic changes have survival of more than 8hrs. Sudden is still the disease of middle age group showing rising incidence in younger age. Most common artery stenosis found was left anterior descending artery (LAD) and most of cases shows grade-3 or grade-4 stenosis. Microscopic findings seen in the survival of more than 8hrs.

Key Words: Coronary stenosis, BMI, CAD

INTRODUCTION

Coronary artery disease is the most frequent cause of sudden and unexpected deaths which constitute a significant portion of the autopsies that are conducted by Forensic Medicine Department in our country. [1-5]

Various studies show that major risk factors for atherosclerosis are hypertension, diabetes, and family history of coronary artery disease (CAD). Gross and microscopic findings are seen when survival time more than 6 hrs. On macroscopically atheromatous area looks like raised yellowish plaque. Initially the lesion is focal then become confluent, mostly eccentric thickening of wall then whole lumen is involved. [4,6]

The present study was an attempt to provide incidence and severity of coronary stenosis and gross ischemic changes in relation to various epidemiological risk factors and the frequency of individual coronary artery in coronary artery disease.

MATERIALS AND METHODS

The present study was carried during the period of December 2010 to August 2012. Total 130 cases were studied. Cases coming at autopsy with sudden deaths were included in study. Decomposed cases were excluded. Detail history about risk factors

and previous ischemic attack were taken. Heart was cut from the major vessels then separated. Then heart dissection was done and heart was examined by necked eye for stenosis in individually dissected coronary arteries for the blockage of lumen and graded accordingly. Then arteries were examined histopathologicaly (H&E) for blockage.

OBSERVATIONS & RESULTS

Male cases (76.2%) were prone to stenosis than female (23.8%). Most number of the cases (23.07%) was in age group between 41-50years. Maximum female cases (8.4%) were in age group 21-30 years and maximum male cases (20.8%) were in age group 41-50 years.

Table No.1 Age and sex wise distribution of cases:

Age group	Males (%)	Females (%)	No. of cases (%)
<10	1(0.8%)	0(0%)	1(0.77%)
11-20	3(2.3%)	5(3.8%)	8(6.1%)
21-30	11(8.5%)	11(8.4%)	22(16.9%)
31-40	23(17.7%)	5(3.8%)	28(21.5%)
41-50	27(20.8%)	3(2.3%)	30(23.07%)
51-60	16(12.3%)	6(4.6%)	22(16.9%)
61-70	13(10%)	0(0%)	13(10%)
71-80	4(3.1%)	0(0%)	4(3.07%)
81-90	1(0.8%)	0(0%)	1(0.77%)
Total	99(76.2%)	31(23.8%)	130(100%)

Cases showing grade-4 stenosis in LAD (44.44%) were in between age group 50-70yrs.

Table No.2 Stenosis in LAD and age wise distribution of cases:

Age group	Grade of stenosis in LAD*			
	1	2	3	4
<10	-	-	-	-
11-20	-	-	-	-
21-30	1	-	-	1
31-40	1	1	-	7
41-50	2	-	-	5
51-60	-	2	4	6
61-70	1	1	1	6
71-80	1	-	-	2
81-90	-	-	-	-

Cases having history of hypertension, diabetes or smoking shows grade-4 stenosis.

Table No.3 Risk factors and LAD blockage:

Risk factor	No. of cases (%)	Grade of LAD stenosis*			
		1	2	3	4
Hypertension	9(6.9%)	2	-	-	7
Diabetes	3(2.3%)	-	-	-	3
Smoking	4(3%)	-	-	1	3
Alcohol	1(0.8%)	-	-	-	1
HT & Diabetes	2	-	-	-	2

Cases having more than 25 BMI have maximum grade of stenosis (72.3%).

Table No.4 Case distribution according to BMI and Coronary stenosis:

BMI	No. of Cases	Grade of stenosis in LAD*			
		1	2	3	4
<25 (Averagely built)	83(63.8%)	72	3	2	6
25-30 (Overweight)	35(26.9%)	19	-	2	14
>30 (Obese)	12(9.3%)	4	-	1	7

Most of cases of hypertrophy of heart were more than 40 years.

Table No.5 Heart weight and coronary blockage:

Heart weight	No. of cases (%)	Age *							
		<20	21-30	31-40	41-50	51-60	61-70	70-80	80-90
<200-250gms	40(30.7%)	5	8	9	6	6	4	1	-
251-300gms	59(45.5%)	4	13	14	15	6	5	2	-
301-350gms	16(12.3%)	-	-	5	5	5	1	-	-
>350gms	15(12.5%)	-	-	1	4	5	3	2	-
Total	130(100%)	-	-						

It was observed that LAD (32.3%) was the most common artery of stenosis and RPD (11.5%) artery is least commonly involved. Maximum grade of stenosis were seen in LAD (24.6%) followed by LM (12.3%).

Table No.6 Distribution of grade of stenosis in arteries:

Arteries	Grade of Stenosis*					Total (Stenosis)	%
	0	1	2	3	4		
R1 (RM)	101	13	7	5	4	29	22.3%
R2 (RPD)	115	8	4	3	0	15	11.5%
L1 (LM)	95	14	5	6	10	35	27.7%
L2 (LAD)	88	6	4	5	27	42	32.3%
L3 (LC)	107	8	6	5	4	23	17.7%
Total		49 (37.7%)	26 (20%)	24 (18.5%)	45 (34.6%)		

Table No.7 Maximum grade of stenosis:

Artery	Maximum grade of stenosis (Grade:3&4) No. of cases*		No. of cases (%)
	Grade:3	Grade:4	
R1 (RM)	5	4	9(6.9%)
R2 (RPD)	3	0	3(2.3%)
L1 (LM)	6	10	16(12.3%)
L2 (LAD)	5	27	32(24.6%)
L3 (LC)	5	4	9(6.9%)
Total	24(18.5%)	45(34.6%)	69(53.1%)

40% of cases had survival period of <4hrs and 25% had survival period of 4-8 hrs out of that more than 50% were showing grade-3 or grade-4 stenosis.

Microscopic findings were seen in (13.07%) cases out of that grade-4 stenosis seen in (70.58%) and all survived more than 8hrs.

Table No.8 Correlation of gross changes and coronary blockage

Microscopic changes	No. of cases	Grade of stenosis in LAD			
		1	2	3	4
	17(13.07%)	3(17.64)	2(11.76%)	-	12(70.58%)

*multiple response

DISCUSSION

Following are the discussion points with other studies on the various parameter of observation:

In this study maximum number of coronary lesion cases were found in age group 5th and 6th decade, this findings corroborate with Gupta et al, [2] Sharma et al, [7] Revathi et al, [8] Gohel et al, [9] Ahmad et al. [10] While Chen and Huang [11] said that it was common in 4th and 5th decade. This age difference may be due to different geographical region and environmental factors.

In the present study it was observed that incidence of sudden death were more in males than females which is more or less similar to most of the studies done in past. [7-9, 11-14] This is due to male cases were more than female at autopsy.

In the study the incidence and severity of coronary artery stenosis was higher in males. In this study we had found male cases more who showed ischemic changes were 23(17.7%) and only 3(11.5%) were female. Which is consisting with Sharma et al, [7] Revathi et al [8] and Gohel et al. [9] This is due to male cases are more at autopsy and males have more stress, smoking habits and absence of cardioprotective hormone estrogens.

In present study association with hypertension present in 6(23%) cases and association with smoking found in 4(15.3%) cases. This is corroborative with most of the other studies. [5,7,9,12]

In this study those had BMI >25 kg/ $(m)^2$ they had more chance to get stenosis. This is consistence with Ahmad et al, [10] Rastogi et al [15] and Strong et al; [16] they said that as BMI increases chances to get ischemic changes were also increases. This is also due to one of the risk factor obesity,

which is due to junk food, sedentary lifestyle and bad habits.

In this study cases who had heart weight >300grams they were showing coronary artery stenosis >50% which is consistence with Sharma et al. [7]

In this study most common artery involved for stenosis was LAD in 42 (32.3%) cases which is consistence with Sharma et al, [7] Ahmad et al [10] Chen and Huang, [11] Yazdi et al, [13] Garg et al [14] Davies, [17] and Geske et al; [18] Possible explanation is LAD is major artery supplying left ventricle which has greater mass and increases O_2 need and this artery has to do more work. Other reason may be the course of the LAD.

The cases which had ischemia could be divided into 2 groups. One group was with high (maximum) grades of arterial stenosis and the other with lower grades. We had found that maximum grade of stenosis seen in LAD in 32(24.6%). This is consistence with most of studies. [7,9]

Another objective of the study was to correlate myocardial ischemia detected with the grade of stenosis in the coronaries. This study also indicates a strong correlation between the arterial lesions of coronary atherosclerosis and ischemic heart disease in that both the incidence and severity of atherosclerotic lesions were greater in the hearts that showed ischemic changes, which is consistence with Sharma et al [7] and Chen and Huang. [11] This agrees with Strong and McGill. [12] Which is due to decrease in the myocardial perfusion as the stenosis increase.

The findings of the present study reveal that coronary atherosclerotic lesions are present in almost all the adult autopsies. All the subjects above age of 30 had some degree of atheroma or stenosis. The youngest male to show atheroma in the coronaries was 28 years; the youngest female was 29 years. The adult cases hence cannot be divided into subjects having and those not having atherosclerosis, only the disease could be further classified according to the degree of stenosis in each artery. This concurs with the findings of Strong & McGill. [12] While Strong et al [16] said that atheromatous lesion starts at 15-19 years.

SUMMARY AND CONCLUSION

Sudden death due to acute myocardial infarction is still the disease of middle age group showing rising incidence in younger age. Males are more prone to develop acute infarction than females. Association with smoking, hypertension, diabetes and body weight was in most of the cases. There was increase chance of ischemia after age of 50 years. In this study we found that those who had heart weight >300grams there was increases chances of myocardial ischemia. Most common artery stenosis found was left anterior descending artery (LAD) and most of cases shows grade-3 or grade-4 stenosis.

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