



Original Research Article

A study of post mortem examination of heart in acute myocardial infraction

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ABSTRACT

Introduction: The prevalence of the ischemic heart diseases is increasing globally which is also associated with high prevalence as well mortality. Associated comorbidities like diabetes and hypertension increases the associated mortality and morbidity. Atherosclerosis of the coronaries and resultant narrowing of the lumen is the associated underlying cause.

Aims and Objective: The aim of the present study was to study gross pathological changes in heart in case of acute MI as well as the sex preponderance of the disease and other related factors.

Material and Methods: In this prospective study, conducted at the tertiary care government hospital, 35 cases of sudden death subsequent to acute myocardial infraction were enrolled. This study was conducted during the period from April 2017 to July 2018. All the cases were studied for myocardial infraction and its underlying pathological changes in the myocardium as well as the blockade of coronary arteries.

Results: A total of 35 subjects (20 M, 15 F), the mean age of the subjects was 55.02 years whereas the maximum numbers of subjects were of 50-59 years of age. Majority of the subjects were found to follow sedentary lifestyle. 28 subjects showed grade 2 and 6 cases showed grade 3 blockage in the right coronary artery. In the left anterior descending artery: Out of 35 cases, 1 case showed grade 1 block, 25 cases showed grade 2 blockages and 9 cases showed grade 3 blocks. The examination of aorta showed in 2 cases grade 1 block, in 20 cases grade 2 block and in 13 cases grade 3 block. 8 cases showed hemorrhagic myocardium.

Conclusion: It was concluded in the present study that the maximum incidence of MI was associated in the age group of 50-59 years and it is associated with sedentary lifestyle. Males were more commonly affected than females. Coronary atherosclerosis is one of the most common underlying cause, the right coronary being the commonest artery involved.

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1. Introduction

The Ischemic heart diseases (IHD) account for a high mortality in the Indian population (52%) and as compared to the rest of the world, IHD precipitates approximately 10 years earlier in the Indians.^{1,2} There have been as suggestion to organize cohort studies as well as registries to generate the statistics related to the prevalence and incidences of cardiovascular diseases and related mortalities.³

As high as 50% of the deaths due to CVD occurs before the patient reaches the hospital. Lifestyle modification,

advancements in the medical sciences as well as control of the comorbidities like diabetes mellitus has almost reduced the mortality due to IHD up to 33%.⁴ The changes imparted on the heart by the pathogenesis of ischemic heart diseases cannot be examined in detail during the life which makes the postmortem examination of the heart a valuable source of information.⁵

The aim of the present study was to study gross pathological changes in heart in case of acute MI as well as the sex preponderance of the disease as well as other related factors.

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2. Materials and Methods

In this prospective study, 35 cases of sudden death were enrolled in. This study was conducted at the tertiary care government hospital attached to post-mortem centre during the period from April 2017 to July 2018. All the cases were studied for myocardial infraction and its underlying pathological changes in the myocardium as well as the blockade of coronary arteries. The ethical permission required for the study was obtained from the respective Institutional Ethics Committee. Patients having increased level of cardiac Troponin I because of conditions like cardiac surgery, renal failure, hypothyroidism, severe burns and sepsis were excluded from the study. The age of the sudden death cases enrolled in the study were 18 years and above. All the cases were studied by detailed autopsy protocol.

2.1. Method for examination of heart

The heart was removed during the autopsy and washed properly in the running tap water to remove the clots and fixed in 10% formalin for minimum 24 hours. After fixation, the heart was examined externally for infraction as well as other anomalies if any and weighed. Afterward, the heart was opened by the method described by Virchow⁶ and various structures like endocardium, coronary openings, valves and aorta were examined internally.

The coronaries were dissected by transverse sections at regular intervals of 3 mm. The sections were studied for the diameter of coronary lumen as well as the status of the wall (atherosclerotic thickening). The sites showing the maximum narrowing or thromboembolic blockade were sectioned for routine microscopic examination. The heart was then cut in to transverse section of 1 cm thickness. The slices were then examined grossly.

3. Results

This study was conducted to study the gross anatomical changes due to acute MI as well as the associated coronary blockade in case of the sudden death through autopsies performed in the institution.

A total of 35 subjects were enrolled in the study out of which there were 20 males and 15 females (ration 4:3). The mean age of the subjects was 55.02 ± 23.4 years whereas the maximum numbers of subjects were of 50-59 years of age. (Table 1) The age group of 50-59 years comprised of 12 subjects were as 60-69 years, 30-39 yeas and >70 years group comprised 6, 5 and 5 cases respectively. Majority of the cases are found in age group of 50 to 59 year group, it suggest that age group 50 to 59 year group more prone to the sudden death with heart pathology. (Table 2)

The distribution of cases according to the nature of work revealed 62.9 cases had sedentary work and lifestyle as compared to 37.1 percent of cases doing labour work. From

Table 1: Gender distribution of cases

Gender	Frequency	Percentage
Male	20	57.1
Female	15	42.9
Total	35	100

Table 2: Distribution of cases amongst different age groups

Age Group	Number of cases	Percentage
30-39yrs	5	14.28
40-49yrs	7	20
50-59yrs	12	34.26
60-69yrs	6	17
>70yrs	5	14.28
Total	35	100

analysis of the data it can be said that, the people having sedentary lifestyle are more prone to sudden death due to heart pathology. (Table 3) Maximum numbers of cases were observed in overweight category (24 cases). Although there appears decrease in number of cases in obese category.

Table 3: Distribution according to nature of work

Nature of work	Frequency	Percentage%
Sedentary	22	62.9
Labour	13	37.1
Total	35	100

Table 4: Distribution of cases according to the Body mass index

Grading	Cases observed	Percentage%
18.5- 24.99	6	17.14
25-29.99	24	68.57
30-34.99	5	14.28
Total	35	100

3.1. Gross examination

Out of 35 cases, 1 case showed grade 1 block whereas 28 subjects showed grade 2 and 6 cases showed grade 3 blockade in the right coronary artery. In the left anterior descending artery: Out of 35 cases, 1 case showed grade 1 block, 25 cases showed grade 2 blockages and 9 cases showed grade 3 blocks, majority of arteries blockage are grade 2 blocks. The examination of aorta showed that in total 35 cases, 2 cases showed grade 1 block, 20 cases showed grade 2 block and 13 cases showed grade 3 block. As per this observation it can be said that most of the cases shows grade 2 blocks. Grading of narrowing and blockage of arteries was done as follows: Grade 1: artery appears normal and shows less than 25% block. Grade2: artery appeared slightly narrowed and shows 25 to 49% block. Grade 3: artery shows narrowing and 50 to 75% block. Grade 4: artery shows narrowing and more than 76% block.

Table 5: Grading of coronaries and aorta

	Grade 1 <25% block	Grade 2 26-49% block	Grade 3 50-75% block	Grade 4 >75% block	Total
RCA	0	28	7	0	35
LAD	0	26	9	0	35
Aorta	0	22	13	0	35

Table 6: Showing standard of deviation from mean of coronary artery and aorta block

		Right coronary artery blockage	Left ant descending coronary art blockage	Aorta blockage
N	Valid	35	35	35
	Missing	0	0	0
Mean		41.80	43.71	44.51
Std. Deviation		7.308	8.344	10.489
Minimum		30	30	30
Maximum		60	60	70

Table 7: Condition of myocardium among male and female cases

	Intact	Hemorrhagic	Total
Male	16	5	21
Female	11	3	14
Total	27	8	35

As shown in per Table 7, it was seen that out of 35 cases myocardium showed haemorrhages in 8 cases, while in remaining cases myocardium was found to be intact. Out of these 8 cases of haemorrhagic myocardium, 5 were males and 3 were females cases. In all the cases, pericardium was intact and no pathology was observed on pericardium.

4. Discussion

A total of 35 cases were autopsied and studied for pathological changes in the myocardium due to acute MI.

The minimum number of cases (5) in the present study were found in the youngest and the oldest age group, i.e. 30-39 years and >70 years respectively. The highest number of cases were observed in the age group of 50-59 years (12 cases – 34.26%) followed by 40-49 years (7 cases – 20%). This findings of the present study were comparable with the same of Bardli and Falzi et al,⁷ Pell and D'Alonza et al.⁸ They found the commonest age group with highest number of subjects in the age group of 50-59 years. However, Shushma Pandey et al,⁹ Udnoon J et al¹⁰ and Andrew Farb et al¹¹ found the commonest age group for the disease to be 40-49 years. This comparison shows the epidemiological shift of myocardial infraction towards older ages which is correlated to the urbanization, sedentary life style and inappropriate food habits.¹²

Myocardial infraction was observed to be more prevalent in the males which correlates with the observations of Bardoli G et al⁷ as well as Pell and D'Alonza et al⁸ who also found the prevalence of acute MI to be more amongst the males. This difference decreases with advancing age

particularly after 50 years of age. The possible reason for the same could be the protection provided by estrogen against myocardial infraction during the reproductive life.¹³ After the menopause, decrease in the levels of the estrogen may be responsible for rapid precipitation of ischemic heart diseases.^{4,14} However, due to the limited sample size, this aspect cannot be conclusively established in the present study.

Atherosclerosis was found to be most common factor responsible for myocardial infraction resulting in narrowing of the coronary lumen. The luminal narrowing of up to 50% were observed to be in majority of the cases. This finding is in contrast to the previous reports which reported it to be >75% of narrowing in lumen responsible for the maximum number of cases.¹⁵⁻¹⁸

In the present study, right coronary artery was the commonest involved artery by the atherosclerotic process (narrowing up to 50% of cross-sectional area of the lumen) followed by left anterior descending artery.

The frequency of involvement of coronaries in present study was found to be contrary to studies by Andrew Farb et al,¹⁴ Chandra S and Tiagi¹⁹ and Mc Namara et al.²⁰ who observed the left anterior descending artery to be more commonly involved than the right coronary artery. In the present study, 27 cases showed the intact myocardium whereas 8 cases were seen to have haemorrhagic myocardium. This observation is in agreement with the findings of the previous studies.^{21,22}

5. Conclusion

It is concluded in the present study that the expected higher prevalence of MI was observed in the age group of 50-59 years and it is associated with sedentary lifestyle. Males were more commonly affected than females. Coronary atherosclerosis is one of the most common underlying cause, the right coronary being the commonest artery associated. However, the limitation of the present study is its smaller sample size. We recommend conduction of larger study with more precise objectives for further evidence generation.

6. Source of Funding

None.

7. Conflict of Interest

None.

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