PATHOLOGICAL FINDINGS IN HEART AUTOPSY- A 18 MONTHS RETROSPECTIVE STUDY

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Abstract

Background: Coronary artery disease due to atherosclerosis is an epidemic in India. The incidence of coronary artery disease has doubled during past three to four decades. With this background a retrospective histomorphological study of heart pathology was conducted to study the age, sex and frequency distribution of various heart pathological lesions. **Material & Methods:** Two hundred and fifty specimens of heart received in the Department of Pathology, Smimer Surat, were examined grossly as well as microscopically. **Results:** Abnormal findings on heart autopsy were atherosclerosis, coronary artery disease, myocardial hypertrophy and myocarditis. The study showed an alarmingly high prevalence of atherosclerosis. The pathogenesis of coronary atherosclerosis begins at a younger age in Indian population. Though the incidence of atherosclerosis is more common in males compared to females; coronary atherosclerosis is an important risk factor for IHDs in both sexes. **Conclusion:** Screening for coronary atherosclerosis should begin at an early age.

Key words: Heart, atherosclerosis, coronary artery disease, myocardial hypertrophy, myocarditis, autopsy, coronaries

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Introduction:

The human heart is a pump that propels over 6000 liters of blood through the body daily and beats more than 40 million times a year.[1] Cardiovascular disease is the number one cause of death worldwide, with about 80% of the burden occurring in developing countries.[2,3] About 32% of heart disease deaths are premature , occurring in individuals younger than 75 years of age.[4] If all major forms of cardiovascular disease were eliminated, life expectancy would increase by 7 years. Ischemic heart disease (IHD) is the leading cause of death worldwide for both men and women (7 million cases per year). In more than 90% of cases, the cause of myocardial ischemia is reduced blood flow due to obstructive atherosclerotic lesions in the coronary arteries. Thus, IHD is often termed

coronary artery disease (CAD) or coronary heart disease.[1]

Coronary artery disease due to atherosclerosis is an epidemic in India. The incidence of coronary artery disease has doubled during past three to four decades. It will soon emerge as the single largest disease accounting for nearly one-third of all deaths in India. A total of nearly 6.4 crore cases of coronary vascular disease are likely in the year 2015, nearly 96% would be coronary heart disease cases. Deaths from this group of diseases are likely to amount to be a staggering 34 lakh. An estimated 1.3 million Indians died from this in 2000.[5]

The projected death from coronary artery disease by 2015 is 2.95 million, of which 14% will be <30 years, 31% will be <40 years.[6]

American Heart Association criteria for grading atherosclerotic lesions.[7,8]

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 well-defined core (intermediate lesion or pre-atheroma)

Grade 4 - well defined lipid core with luminal surface covered by normal intima (atheroma or fibro plaque)

Grade 5 - lipid core with a fibrous cap with or without calcification (fibro- atheroma)

Grade 6 - fibro-atheroma with cap defect such as haemorrhage and thrombosis

Grade 7 - calcification prominent

Grade 8 - fibrous tissue change prominent

MI can occur at any age, but its frequency rises progressively with increasing age. Nearly 10% of myocardial infarcts occur in people under age 40, and 45% occur in people under age 65. Women are protected against MI and other heart diseases during the reproductive years. However, the decrease of estrogen following menopause is associated with rapid development of CAD, and IHD is the most common cause of death in elderly women.[1]

Hearts from patients with chronic IHD are usually enlarged and heavy, due to left ventricular hypertrophy and dilation. There is some degree of obstructive coronary atherosclerosis.

Under the designation myocarditis are a diverse group of pathologic entities in which infectious microorganisms and/or an inflammatory process cause myocardial injury.[11] With this background a retrospective study was conducted to study the histomorphological spectrum of heart pathology among 250 autopsy patients in Surat.

The objectives of the present study were to assess, classify and study the age, sex and frequency of occurrence of various heart pathological lesions and to compare our study results with other studies.

Material and methods:

Two hundred and fifty specimens of Heart, received in the Department of Pathology, Surat municipal institute of medical education and

research (SMIMER) Surat, were examined grossly as well as microscopically.

Post-mortems being done in our institutions are usually cases of sudden death, chest pain, poisoning, road traffic accidents and medicolegal cases. Heart specimens were received either as a part of examination of multiple viscera, or only Heart was taken out from the dead body from mortuary for pathological examination. Mild to moderate autolytic changes are seen in the specimens as they are brought by police and reach Pathology Department/histopathology laboratory quite late.

The medical history and clinical diagnosis before death were, in few of the cases, unavailable. The heart was fixed in 10% formalin. The exposed artery was carefully examined for any thickening, yellow streaks, frank plaque or calcification. Then ventricles were sectioned transversely at 10 mm intervals commencing from apex. After routine processing and paraffin embedding 4 micro-meter sections were taken.

All the histological sections were examined microscopically for the presence of atheroma, ischemic heart disease, myocardial hypertrophy and myocarditis. The vessels were examined for the presence of atherosclerotic lesions which were graded according to American Heart Association.

Results:
During the study period from January 2013 to June 2014; 250 consecutive autopsied hearts were submitted to the Department of Pathology. 204 specimens were from males and 46 from females deceased.

Table 1 : Heart weight and sex-wise distribution of the specimens

Heart Weight	Males	Females	Total
0-50	2	-	2
51-100	5	5	10
101-150	1	-	1
151-200	24	12	36
201-250	29	7	36
251-300	66	10	71
301-350	26	6	32
351-400	24	4	28
401-450	13	1	14
451-500	6	1	7
501-550	2		2
551-600	3	-	3
601-650	3	-	3
Total	204	46	250

153 heart weighed <350grams in males and 34 heart weighed <300 grams in females.51 specimens in males and 12 specimens in females were more than 350 grams and 300 grams respectively.(Table 1)

Table 2: Age and sex distribution of cases with infarction

Age	Males	Females	Total	%age
0-10	0	0	0	0.0
11-20	0	0	0	0.0
21-30	3	1	4	7.84
31-40	12	0	12	23.52
41-50	8	1	9	17.64
51-60	12	1	13	25.49
61-70	8	3	11	21.56
71-80	2	0	2	3.92
81-90	0	0	0	0.0
Total	45	6	51	100

In Males, 8 cases out of 24(33.3%) and in Females, 1 case out of 5(20%) were associated with coronary artery disease.

Table 3: Age and sex distribution of cases with myocardial hypertrophy

Age	Males	Females	Total	% age
0-10	0	0	0	0.0
11-20	0	0	0	0.0
21-30	2	1	3	10.34
31-40	2	1	3	10.34
41-50	10	0	10	34.48
51-60	5	2	7	24.13
61-70	3	1	4	13.79
71-80	2	0	2	6.89
81-90	0	0	0	0.0
Total	24	5	29	100.0

In present study highest incidence of Myocardial hypertrophy was among 41-50 years males.

Table 4: Age & Sex wise distribution of Atherosclerotic Lesion Types Advanced by Histology Advanced grade (type IV to VIII) Atherosclerosis

Coronaries Male	Normal	Advanced atherosclerosis	% (103 case)	% (250 case)
0-10	5	-	0	0
11-20	17	1	0.97	0.4
21-30	9	9	8.74	3.6
31-40	11	16	15.53	6.4
41-50	13	34	33.00	13.6
51-60	2	24	23.30	9.6
61-70	-	13	12.62	5.2
71-80	-	5	4.85	2
81-90	-	1	0.97	0.4
TOTAL	-	103	100	41.2
Coronaries Female	Normal	Advanced atherosclerosis	% (16 case)	% (250 case)
0-10	4	-	0	0
11-20	1	-	0	0
21-30	5	1	6.25	0.4
31-40	6	2	12.5	0.8
41-50	0	3	18.75	1.2
51-60	2	1	6.25	0.4
61-70	-	5	31.25	2
71-80	-	4	25	1.6
Total	-	16	100	6.4

The 3 rd decade of life appears to be a watershed line in the pathogenesis of coronary vascular atherosclerosis, as we observed a steady increase in overall frequency, and severity of atherosclerosis from the 3 rd decade onwards [Table 4].

In present study, only 3 cases of Myocarditis (1.2%) are found.

Fig 1. Gross examination of heart shows a large area of healed infarct in case of chronic ischemic heart disease
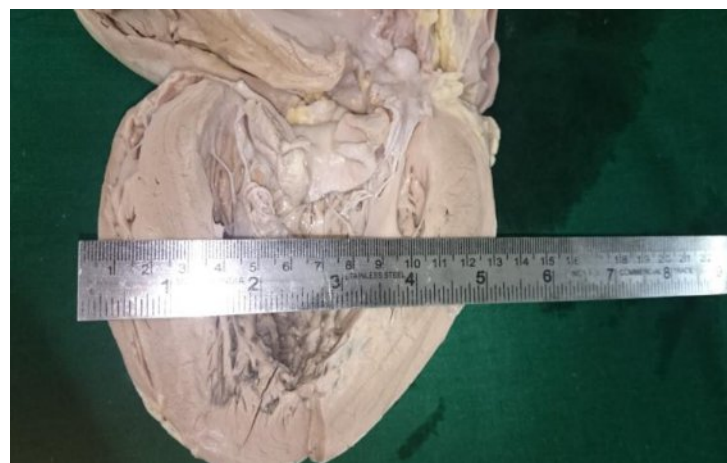

Fig 2. Gross examination of heart shows marked thickened left ventricle wall in case of myocardial hypertrophy

Discussion:

The study of human atherosclerotic lesion is an extremely difficult task in a living subject and autopsy study is the best possible way to work on it. Though our study involved only a small number of

cases, most of our observation correlated with the many similar studies. In present study highest incidence of coronary artery disease was among 31-40 years males. The age of MI patients ranged between 21 and 80 years .Acute MI was seen in 13 cases (5.2%) comparable with the observations reported by Maru (6.5%) [12] and Priti et al (10.8%).[13] Myocardial infarction was the cause of death in 13 cases while 38 showed changes of chronic ischemic heart disease. (Fig 1)

In present study highest incidence of Myocardial hypertrophy was among 41-50 years males. (Fig 2)

In Males, 8 cases out of 24(33.3%) and in Females, 1 case out of 5(20%) were associated with coronary artery disease. In present study higher percentage of atheroma was found in 41-60 years of age (56.30%) in males .In females incidence of atheroma was markedly increased in post menopausal age. American Heart Association characterized and classified atherosclerotic lesions from type 1 to type 7. 41.2 % males and 6.4% females showed atheroma. Commonest type of atherosclerosis seen was grade-V. Atherosclerotic lesions develop very early in life starting from age 20 years onwards. Overall incidence of atherosclerosis was found to be 47.6% which was comparable with the frequency given by Yazdi et al (40%) [14] and Golshahi et al (28.9%) [15]. The degree of atheroma encountered in different age groups and in two sexes. In our study it was observed that after the second decade atherosclerosis suddenly increases and under 20

years rarely advanced plaques existed. Although we cannot explain the reason for its sudden increase after the third decade but it requires further investigation. Myocarditis is uncommon compare to coronary artery disease in this study.

Conclusion:

The study showed unexpectedly high prevalence of atherosclerosis in India. Though the incidence of atherosclerosis was more in males as compare to females, but in both sexes it was alarming. After the second decade atherosclerosis suddenly increased and under 20 years rarely advanced plaques were seen. This study highlights the importance of cardiovascular risk factors screening from early age of third decade.

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