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Histomorphological study of heart diseases at rural tertiary hospital: An autopsy study

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Abstract

The aim is to study histopathological spectrum of various cardiovascular lesions with reference to age & sex and to determine the cause of sudden cardiac death and study the histomorphological changes in the heart after death. An observational study was carried out on 259 autopsy cases from January 2018 to June 2019. In total, 221 cases were included in this study. Out of 221 cases, 174 cases showed pathology in heart, coronaries and aorta. Atherosclerosis (53%) was most common finding, followed by myocardial infarction (MI) (19.5%). Myocardial infarction due to atherosclerosis is probably the most common finding encountered in medicolegal autopsies.

Keywords: Heart, atherosclerosis, coronaries, autopsy

Introduction

The autopsy is for long been regarded as the 'gold standard' as the most important tool for retrospective quality assessment of clinical diagnoses as well as a key education tool.¹ Sudden cardiac death is commonly defined as an unexpected natural death due to cardiac cause within a short time period (usually within one hour) with or without onset of symptoms and without any prior conditions that would appear fatal^[2]. The majority of sudden cardiac deaths (SCDs) are attributable to atherosclerotic coronary artery disease and are manifest in the older population, whereas cardiomyopathies predominate in the young (<35 years)^[3]. Reduced mortality from infectious diseases and the adoption of Western lifestyles has led to increased prevalence of ischemic heart disease in developing nations. More than 80% of cardiovascular deaths are associated with coronary atherosclerosis^[4]. Myocarditis is also a recognised cause of sudden unexpected death in both children and adults^[5]. Myocarditis is a recognised cause of cardiac failure in childhood and may present with non-specific clinical features of progressive cardiac dysfunction or with those of dilated cardiomyopathy^[5]. Congenital heart diseases, which make up about 1% of human malformations, are among the most common malformations in fetuses. They contribute significantly to infant mortality rate due to poor prognosis^[6]. The purpose of this study was to determine the cause of sudden cardiac death and observe the morphological changes in the heart after death.

Aim & objectives

1. To study histopathological spectrum of various cardiovascular lesions with reference to age & sex.
2. To determine the cause of sudden cardiac death and study the histomorphological changes in the heart after death.

Material method

This is an observational study carried out at a rural tertiary hospital. Data from January 2018 to June 2019 was collected. The clinical records were scanned for age, sex, mode of presentation, past history, the presence of risk factors and investigations if any. The detail of autopsy findings, were obtained from the autopsy records. Hearts were studied in detail both grossly and microscopically.

All samples were received either medicolegal or clinical autopsies from Department of Forensic Medicine or from nearby government hospitals or health centers. Specimens were identified by notes & labels. Grossing was done after fixation in 10% formalin, to obtain

blocks and to prepare slides of sections. Haematoxylene & eosin stained slides were studied under microscope.

Results

Of the 259 autopsies done at SRTR Government Medical College and Hospital, Ambajogai, 231 heart specimen were received, 10 specimen were autolysed (Table 1). So, 221 cases were included in this study. Our study included cases between newborns to 100 years old. Out of 221 cases, 156 (70.9%) were males and 64 (29.1%) were females. Sex determination of one case was not possible because of decomposition. Maximum number of cases studied, were between 51-60 age group (Table 2).

Table 1: Total number of cases

Total Autopsies	259
Heart Specimen Received	231
Autolysed specimen	10
Total cases	221

Table 2: Age-Wise and Sex-Wise Distribution of Cases

Age Groups (In Years)	Males	Females	Number of Cases
0-10	10	12	22 (10%)
11-20	07	11	18 (8.2%)
21-30	20	14	34 (15.5%)
31-40	33	08	41 (18.6%)
41-50	34	03	37 (16.8%)
51-60	36	08	44 (20%)
61-70	13	04	17 (7.7%)
71-80	03	02	05 (2.3%)
81-90	0	0	0
91-100	0	02	02 (0.9%)
Total	156	64	220 (100%)

*Sex Determination of one case was not possible because of decomposition.

In histopathological evaluation, most common finding was atherosclerosis 117 cases (53%) (Figure 1). Triple vessel disease was observed in 76 cases (64.9%) of coronary atherosclerosis. Among 117 cases of atherosclerosis, 40 (34.2%) cases were complicated with calcification within atheromatous plaque, 5 (4.3%) cases showed superimposed thrombus (Table 3).

Aortic atherosclerosis was noted in 136 cases (61.5%) out of total 221 cases. There were 2 cases (0.9%) of aortic dissection (Figure 2). First case was 19 year male and second case was 65 year male. Both cases had history of chest pain and collapse and were brought dead to casualty. Myocardial Infarction (Figure 3) was observed in 43 cases. Out of 43 cases, 31(72.1%) cases showed recent or acute infarct and 12 (27.9) cases revealed old infarct (Table 4).

Table 3: Changes in Coronaries and Aorta

Lesions	Coronary Vessels	Aorta
Atherosclerosis	72(61.5%)	124
Atherosclerosis with Calcification	40(34.2%)	12
Atherosclerosis with Thrombus	05(4.3%)	0
Dissection	0	02
Total	117(100%)	138

Table 4: Myocardial Infarction

Recent/ Acute Infarct	31(72.1%)
Old Healed Infarct	12(27.9%)
Total	43(100%)

Congenital heart disease was present in 2 cases. One was a case of patent ductus arteriosus (Figure 4) and other was congenital aortic stenosis.

Hypertrophic cardiomyopathy and myocarditis accounted for 2 (0.9%) and 3 (1.3%) cases respectively were more common among young population. In hypertrophic cardiomyopathy, heart specimen received were globular enlarged and interventricular septum thickened as compared to left ventricular wall (Figure 5 & 6).

Only one case of left atrial myxoma was observed in present study. Cardiac tumours are rare compared to other heart diseases and tumours of the other organs (Figure 7) ^[12] Cardiac thrombosis (Agonal thrombi involving endocardial surface of both ventricles) was noted in one case (0.5%). Two cases showed prosthetic aortic valve and one case had drug-eluting stent in left anterior descending coronary artery.

Table 5: Various pathological lesions in heart and Aorta and their incidence

Pathological lesion	No. of cases	Percent
Congenital heart disease	02	0.9%
Atherosclerosis	117	53%
Myocardial infarction	43	19.5%
Myocarditis	03	1.3%
Hypertrophic cardiomyopathy	02	0.9%
Cardiac Thrombosis	01	0.5%
Aortic Dissection	02	0.9%
Atrial myxoma	01	0.5%
Prosthetic Valve/ Stent	03	1.3%
No specific cardiovascular lesion	47	21.2%
Total	221	100



Fig 1: Coronary Atherosclerosis (H&E: 4X)



Fig 2: Aortic Dissection on Gross

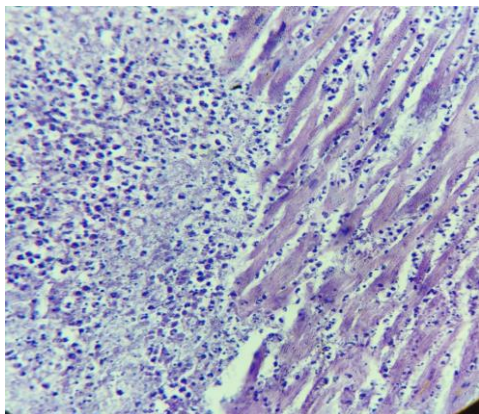


Fig 3: Acute Myocardial Infarction with waviness of myocardial fibres and acute inflammatory infiltrate. (H&E: 40X)



Fig 5: Hypertrophic Cardiomyopathy on Gross



Fig 4: Patent Ductus Arteriosus on Gross

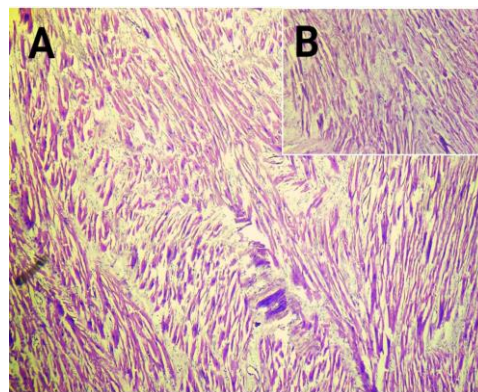


Fig 6: Hypertrophic Cardiomyopathy H&E: A) 10X B) 40X

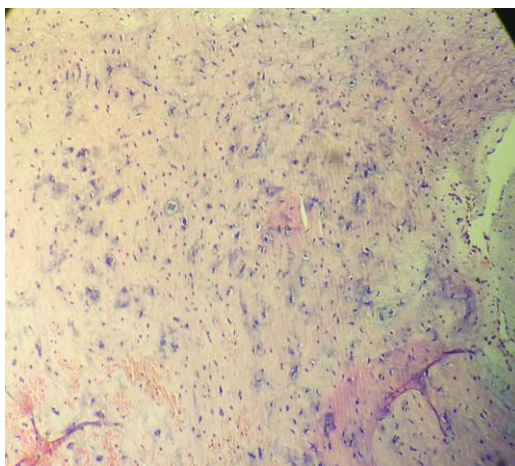


Fig 7: Atrial Myxoma (H&E: 10X)

Discussion

In the present study of 221 cases were included, with age ranging from 0-100 years, maximum number of cases were observed in 51-60 years age group (20%), while Sonawane *et al.*, reported most cases between age group 41-50years (23.38%), also Marwah *et al.* observed most cases in the age group of 41-50 years. However, Garg *et al.* reported maximum cases in the age group of 51-60 years (26.24%) as in the present study. These variations in the age incidence may be due to sample size variation.

Males were commonly affected as compared to females in the present study and in the studies conducted by Wang *et al.*, Garg *et al.*, Ahmad *et al.* and Sonawane *et al.* In the present study, atherosclerosis was the most common cause of death (53%) followed by myocardial infarction (19.5%), myocarditis (1.3%), prosthetic valve (1.3%), hypertrophic cardiomyopathy (0.9%), congenital heart disease (0.9%) and aortic dissection (0.9%). Atherosclerosis was the most common cause of death in all the studies.

Table 6: Comparison of various pathological lesions in heart and Aorta and their incidence

Pathological lesion	Present study	Sonawane <i>et al.</i> [4]	Garg <i>et al.</i> [8]	Marwah <i>et al.</i> [9]	Ahmad <i>et al.</i> [2]
Congenital heart disease	0.9%	-	-	-	-
Atherosclerosis	53%	72.5	55.3	71	79
Myocardial infarction	19.5%	64.4	14.1	25.5	-
Myocarditis	1.3%	3.2	3.5	3	3
Hypertrophic cardiomyopathy	0.9%	3.2	7.09	2.5	8
Cardiac Thrombosis	0.5%	-	-	-	-
Aortic Dissection	0.9%	0.8	-	0.5	-
Atrial myxoma	0.5%	-	-	-	-
Prosthetic Valve/ Stent	1.3%	-	-	-	-
No specific cardiovascular lesion	21.2%	12.09	15.6	-	4

Myocardial infarction was present in 43 (19.5%) cases, recent myocardial infarction (72.1%) was predominant finding in the present study. Sonawane *et al.* classified and reported myocardial infarction as recent MI (32.75%), old MI (48.27%) and both recent & old MI (18.96%). Garg *et al.* reported 70% recent MI and 30% old MI. This difference may be due to time variability between onset of ischaemia and death.

Both hypertrophic cardiomyopathy and myocarditis showed variation in different studies. Sonawane *et al.* 3.2%, Ahmad *et al.* 3% and Bora Ozdemir *et al.* 10%.

Congenital heart disease (0.9%) in present study as compared to 5% Shivshetty *et al.* and 3.7% Khiste *et al.*

In our study, only 1 case of left atrial myxoma (0.5%) was observed. Cardiac myxoma is a neoplasm of the heart with an estimated incidence of 0.5 per million [12].

Conclusion

Myocardial infarction is the leading cause of death with atherosclerosis being the most common underlying pathology. To conclude, histomorphological study provides accurate diagnosis and better understanding of the spectrum of cardiovascular lesions.

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