Original Research Article

A histopathological analysis of prevalence of various heart diseases: an autopsy study

Shilpa Garg, Sonia Hasija*, Puja Sharma, Shivani Kalhan, Neerav Saini, Anam Khan

Department of Pathology, SHKM GMC, Nalhar, Nuh, Haryana, India

*Correspondence:
Dr. Sonia Hasija,
E-mail: drsoniahasija@gmail.com

ABSTRACT

Background: Objective was to study the histopathological spectrum of heart diseases in autopsy specimens, that play a major role as cause of death.
Methods: During the period from October 2015 to October 2017. Total 170 medicolegal autopsies were received during this period. Out of 170, specimens of heart were 150. Nine specimens were autolyzed. So, 141 specimen of heart were included in the study. Gross and microscopic findings on H and E stained sections were studied.
Results: out of 141 cases, 78 cases showed atherosclerosis, 20 cases showed features of myocardial infarction, myocardial hypertrophy was found in 10 cases, 5 cases revealed myocarditis, pericarditis in 4 cases and one case each of infective endocarditis and aortic stenosis. In 22 cases, there was no identifiable cause of death even after complete gross and microscopic autopsy was performed.
Conclusions: Myocardial infarction due to atherosclerosis is probably the commonest finding in death cases subjected to medicolegal autopsies.

Keywords: Coronaries, Heart, Post-mortem

INTRODUCTION

Incidence of cardiac deaths has been increasing all over the world particularly in urban population during last five decades. In India incidence of ischaemic heart disease has increased to about 10%.[1]

One of the challenges faced by the forensic expert is the inability to determine the cause of death in a person previously thought healthy. The autopsies can be a valuable source for epidemiological information in addition to providing valuable information to deceased immediate family.[2]

It is reported that concordance between clinical and pathological cause of death are moderate and autopsy still provides a very important procedure for evaluating causes of death.[2]

Many a time it has been found that when gross pathology could not help to evaluate the cause of death, histopathology can conclusively opine the involved cardiac pathology.

The aim of the present study is to identify the various histopathological lesions of the heart found incidentally and play a major role as cause of death.

METHODS

The present study was carried out at department of pathology, Shaheed Hasan Khan Govt Medical College

Nalhar Mewat from October 2015 to October 2017. Total 170 medicolegal autopsies were received during this period. Out of 170, specimens of heart were 150. Nine specimens were autolysed. So, 141 specimens of heart were included in the study. Epidemiological data and post mortem findings were collected from the post mortem papers and police papers.

Gross examination of heart

Weight and dimensions of whole heart were recorded. The external surface was looked for pericardial pathology and for evidence of recent or old infart. The heart was opened by inflow outflow technique. Measurement of thickness of right ventricular wall, left ventricular wall and interventricular sptum were done. The valves were checked for their number, stenosis and calcification. Regions of either recent or old myocardial ischaemia were checked, and their location and sizes were recorded. All the three coronary arteries right coronary artery, left anterior descending artery and left circumflex coronary artery were examined using regular sections every 4-5mm. The ascending aorta was checked for dilatation thickening or atheromatosis.

Microscopic examination

Sections were taken from right and left atrioventricular junction, right and left ventricular wall, interventricular septum, apex and multiple sections from all the coronary arteries. In addition, sections were taken from suspected pathological lesions. All sections were stained with routine Hematoxylin and Eosin staining and examined under light microscope by using 10x and 40x objectives and results were recorded.

RESULTS

In the present study, 141 specimens of heart were included. Our series was consisted of cases between 11-90years old. Maximum number of cases presented between the age group of 41-60years (Table 1). Out of 141 cases, 107 (76%) were male and 34 (24%) were female. There was remarkable male dominance (Table 2).

Table 1: Age wise distribution of cases.

Range of age in years	No. of patients	%
0-10	0	0
11-20	4	2.83
21-30	24	17.02
31-40	26	18.4
41-50	32	22.6
51-60	37	26.24
61-70	14	9.9
71-80	2	1.4
81-90	2	1.4
Total	141	100

Table 2: Sex wise distribution of cases.

Sex	Number	Percentage (%)
Male	107	76
Female	34	24

In histopathological evaluation most, common finding was atherosclerosis (Figure 1) 78 (55.3%) followed by myocardial infarction (Figure 2, 3) 20 (14.1%) cases, myocardial hypertrophy (Figure 4) 10 (7.09%) cases, myocarditis (Figure 5) 5 (3.5%), pericarditis 4 (2.8%) and one case each of aortic stenosis (Figure 6) and infective endocarditis 1 (0.07%). In 22 (15.6%) cases no specific pathological findings are identified during gross and microscopic examination. (Table 3).

Table 3: Histopathological findings.

Findings	No of cases	% (out of 115 cases)
Atherosclerosis	78	55.3
Myocardial infarction	20	14.1
Pericarditis	4	2.8
Myocarditis	5	3.5
Myocardial hypertrophy	10	7.09
Aortic stenosis	1	0.07
Infective endocarditis	1	0.07
No specific finding	22	15.6
Total	141	100

Among 78 cases which revealed atherosclerotic changes 34 (53.3%) cases had calcification within the plaque and 4 (5.1%) cases had superimposed thrombus formation. (Table 4).

**Table 4: Changes in coronaries (out of 78 cases).**

Findings	No of cases	Percentage
Atherosclerosis	40	51.2
Atherosclerosis with calcification	34	43.5
Atherosclerosis with thrombus	4	5.1
Total	78	100

Out of 20 cases of myocardial infarction, 14 cases showed old infarct, whereas 6 cases revealed recent infarct (Table 5).
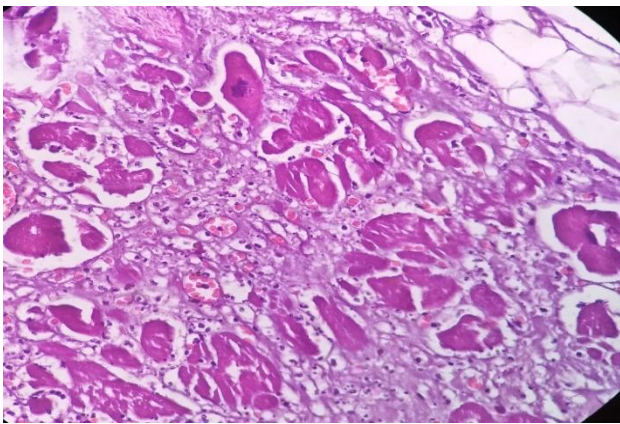
Table 5: Types of myocardial infarction (out of 20).

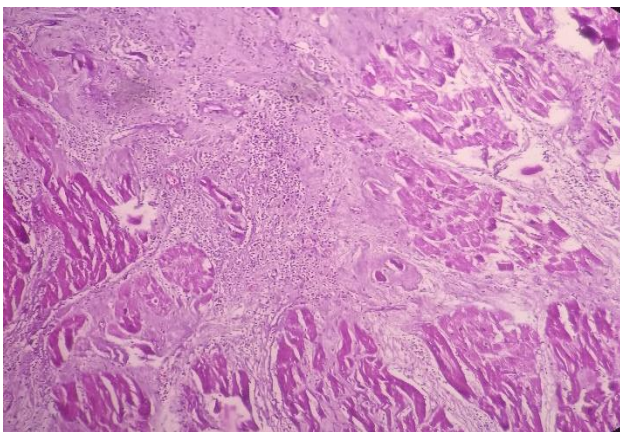| Myocardial infarction	No of cases
Recent	6
Old	14
Total	20
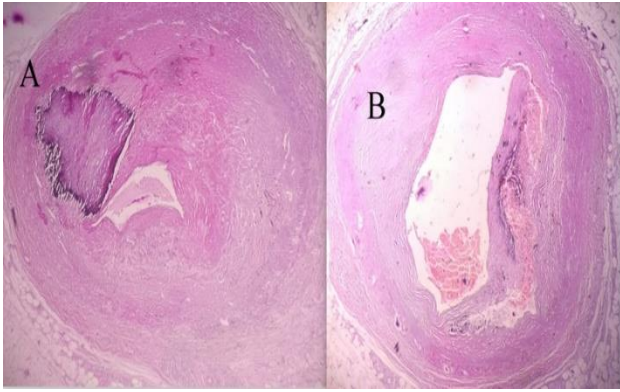
Figure 1: Atherosclerosis A) with medial calcification B) with recanalization (H and E X 400).

Figure 2: Acute myocardial infarct with neovascularisation and presence of inflammatory infiltrate (H and E X 400).


**Figure 3: Old myocardial infarct (H and E X 400).**

DISCUSSION

The autopsy study provides a means of understanding the basic process which sets a stage for clinically significant atherosclerotic cardiovascular disease. There is no valid method of sampling of living population. It was therefore considered that death suspected due to cardiovascular
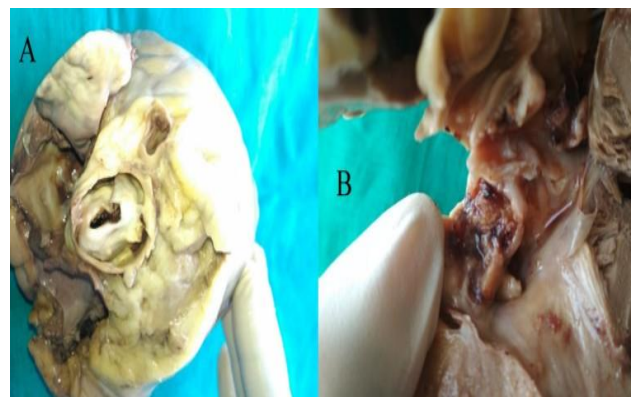
pathology, probably provide the best sample of the living population for studying cardiovascular diseases.[3]
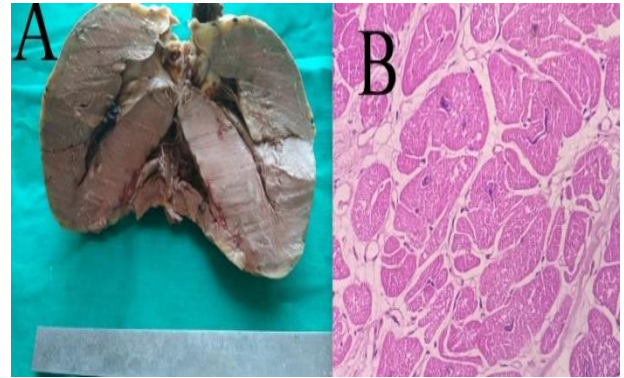
Figure 4: Cardiac hypertrophy A) Gross photograph B) Hypertrophy of myocardial fibres (H and E X 200).
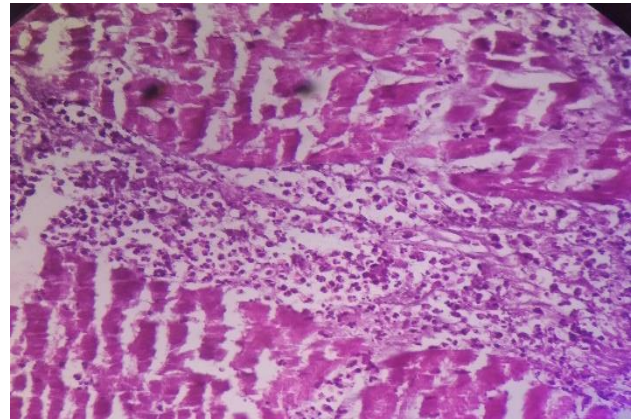
Figure 5: myocarditis with acute inflammation (H and E X 200).

Figure 6: Aortic stenosis (gross).

In this study, most of cardiovascular deaths occurred within age range of 41-60 years. Similar findings were reported by Ramazan Karanfil et al, 17-78 years and Chandrakala Joshi 41-60years.[2,4] This shows that age is a powerful risk factor for heart disease. The development of atherosclerosis increases markedly with age up to an age of about 65.

In the present study males were 76% and females were 24%. This again emphasize that male is at greater risk for heart diseases as compared to females.

In comparison of histopathological findings in this study, coronary atherosclerosis was most common finding present in 78(55.3%) cases. Similar findings were reported by Ramazan Karanfil et al, 75%, stavroula A et al, 77% and Chandrakala Joshi 64%.[2,4,5] Calcification was present in 34(53.3%) cases and thrombus in 4(5.3%) cases. Similarly thrombosis was reported in 4.8% cases by Bora Ozdemir et al.[6]

Plaque calcification is found more frequently in advanced lesions, it may also occur in small amounts in earlier lesions, which appear in 2nd and third decade of life. Histopathological investigations had shown that plaques with microscopic evidence of mineralization are larger. However, the relation of arterial calcification to the probability of plaque rupture is unknown.[3]

In this study histological evidence of myocardial infarction was present in 20(14.1%) cases, similarly Bora Ozdemir et al, reported myocardial infarction in 26% cases.[6] Ramazan et al, reported myocardial infarction in 48% cases, which is higher than our study whereas Wang HY, et al, reported ischaemic heart disease in 7% cases, which is lower than the present study.[4,7] This difference may be due to time variability between onset of ischaemia and time of death. Because microscopic features depend upon the time period between onset of ischaemia and death.

Next common lesion in this study was myocardial hypertrophy which was present in10 (7.09%) cases. In the literature, similar incidence that is 7% was reported by Cristino Basso et al, and Wang HY et al.[7,8] Ramazan Karanfil et al, and Chandrakala et al, reported a much higher incidence of cardiac hypertrophy in 66% and 52% cases respectively.[2,4]

Myocarditis was found in 5 (3.5%) cases. Variable percentage of myocarditis has been reported by different authors. Chandrakala Joshi 9%, Cristina Basso et al, 10%, Bora Ozdemir et al, 7%, Drory et al, 25% and Kramer et al, 29%.[6,8-10]

In the present study pericarditis was found in 4 (2.8%) cases, whereas Chandrakala Joshi reported pericarditis in only 0.86% cases.[2] Primary pericarditis is uncommon, it is mostly secondary to infection. Viruses are usually responsible.[11]

Cardiovascular diseases constitute the most common cause of sudden death. It is well known that lifestyle modification and drug therapy in selected individuals can reduce the risk of cardiac events, but current Framingham risk assessment is suboptimal.

So in medicolegal autopsies it is proposed that every possible organ must be sampled for histopathological examination and must be examined with a multidisciplinary approach (scene investigation, medical history, biochemical, microbiological, toxicological etc.). Histopathology of various organs is very helpful to the forensic surgeons in arriving at a conclusion regarding the cause of death.

CONCLUSION

To conclude, in this study most common cause of death is myocardial ischaemia due to atherosclerosis. Histopathological studies provide the most accurate clues to a better understanding of human cardiovascular diseases. With better insight into disease pathophysiology, novel interventions could be introduced to improve care and future outcomes for patients undergoing cardiovascular diseases.

ACKNOWLEDGEMENTS

REFERENCES

1. Rao D, Sood D, Pathak P, Dongre SD. A cause of sudden cardiac deaths on autopsy findings: a four year report. Emergency. 2014;2(1):12-7.
2. Joshi C. Postmortem study of histopathological lesions of heart in cases of sudden death- an incidental finding. J Evid Based Med Healkthc. 2016;3(6):184-8.
3. Abedinzadeh N, Pedram B, Sadeghian Y, Nodushan SMHT, Gilasgar M, Darvish M, et al. A Histopathological Analysis of the epidemiology of coronary atherosclerosis: An autopsy study. Diagn Pathol. 2016;2(11)127.
4. Karanfil R, Gulmen MK, Hilal A. Evaluation of cardiac conduction system in sudden death cases. J For Med. 2013;27(1):17-28.
5. Papadodima SA, Emmanouil I, Pannagiotis S. Cardiovascular disease and drowning: autopsy and laboratory findings. Hellenic J Cardiol. 2007:48:198-205.
6. Ozdemir B, Celbis O, Onal R. Multiple organ pathologies underlying in sudden natural deaths. Medicine Science. 2012:1(1):13-26.
7. Wang HY, Zhao H, Song LF. pathological study of unexpected sudden death clustered in family or village in Yunnan province: report of 29 cases of

autopsy. Zhonghua Yi Xue Za Zhi 2007;87(31):2209-14.

8. Basso C, Calabrese F, Corrado D. Post mortem diagnosis in sudden death victims: macroscopic, microscopic and molecular findings. Elseivier, cardiovascular research. 2001;50:290-300.

9. Drory Y, Turetz Y, Hiss Y. sudden unexpected deaths in person less than 40 years of age. Am J Cardiol. 1991;68:1388-92.

10. Kramer MR, Drory Y, Lev B. Sudden death in young Israeli soiliers: analysis of 83 cases. Isr J Med Sci. 1989;25:620-4.

11. Kumar, Abbas, Fausto. Robbins basic pathology. Indian Reprint; 8th Edition: ISBN:978-81-312-1036-9 Page No 416.