POSTMORTEM STUDY OF HISTOPATHOLOGICAL LESIONS OF HEART IN CASES OF SUDDEN DEATH - AN INCIDENTAL FINDINGS

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ABSTRACT

OBJECTIVE

To study the histopathological lesions of Heart in cases of sudden death.

METHOD

During the period from 1st July 2014 to 30 November 2015, out of 144 medicolegal autopsies, 120 autopsies of heart were received. Five specimen of heart were autolyzed so 115 autopsy specimen of heart were included for study. Routine H and E staining is used for microscopic examination.

RESULT

Out of 115 cases, 74 cases shows atherosclerosis, 33 cases shows features of myocardial infarction, myocardial hypertrophy found in 60 cases, 11 cases shows myocarditis, vaso-occlusive crisis in sickle cell was present in 6 cases and pericarditis present in 1 case. In 29 cases, there was no identifiable cause of death even after complete gross and microscopic autopsy was performed.

CONCLUSION

It was concluded that myocardial infarction due to atherosclerotic ischaemic heart disease is probably the commonest diagnosis made in majority of sudden death cases subjected to medicolegal autopsies. Histological findings must be evaluated with great attention for preventing incorrect conclusion to identify causes of deaths in sudden death cases.

KEYWORDS

Sudden death, Histological findings, Medicolegal autopsy, Atherosclerosis, Myocardial infarction.

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INTRODUCTION: According to the World Health Organization definition of sudden death is of death within 24 hours from the onset of symptoms, but this time is too long for many clinicians and pathologists: some of them only accept death within one hour from the onset of illness. From a point of view of forensic medicine, sudden natural death is mainly defined as rapid, unexpected and natural death. Although extracardiac causes may be involved in this process, it is assumed that causes of SND are mainly related to cardiovascular events. Most common definition of Sudden Cardiac Death (SCD) is instantaneous cessation of cardiac output in individuals.[1-6]

One of the challenges faced by the forensic pathologist is the inability to determine the cause of death in a person previously thought healthy.

The main objective of a medicolegal autopsy is to determine cause and manner of death and these autopsies help to reveal important data for public prosecutors. These autopsies may be a valuable source for epidemiological information in addition to providing valuable information to the deceased's immediate family.[7-11]

Ischemic heart disease is the leading cause of death worldwide for both men and women. In more than 90%, the cause of myocardial infarction is reduced blood flow due to obstructive atherosclerotic lesion in the coronaries, thus IHD is also termed as Coronary Artery Disease (CAD) or Coronary Heart Disease (CHD).[12]

It was reported that concordance between clinical and pathological causes of death are moderate and the autopsy still provides a very important procedure for evaluating causes of death. Over one-fifth of clinically unexpected autopsy findings can be correctly diagnosed only by histological examination.[13-14]

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

MATERIAL AND METHOD: The present study was a prospective observational study carried at the Department of Pathology during the period of 1st July 2014 to 30th November 2015 in Pt. J. N. M. Medical College Raipur, Chhattisgarh. Total 144 medicolegal autopsies were received during study period. Out of 144, the specimen of heart were 120. Five specimen of heart were autolyzed, so 115

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specimen of heart were included for study. Detailed history and post-mortem findings of all cases were collected.

The post-mortem examination of the heart included measurement of the thickness of the walls of the left and right ventricles and the interventricular septum. The dimensions and weight of the heart were recorded. The valves were checked for stenosis and calcification. The ascending aorta was checked for dilatation, thickening or atheromatosis. Regions of either old or recent myocardial ischemia were checked and their location and size were noted. Finally, the coronary arteries were examined using regular sections every 4-5mm. Their course was recorded along with any thickening, atheromatous lesions and stenosis.[15]

For the histopathological examination of the heart, representative sections were taken from the anterior, lateral and posterior left ventricular wall, the interventricular septum, the anterior and posterior right ventricular wall as well as multiple sections from the coronary vessels. In addition, sections were taken from any regions with suspected pathological lesions.[15-16]

All sections were stained with routine Haematoxylin and Eosin staining and examined under light microscope by using 10x and 40x objectives and results were recorded.

RESULTS: In the present study 115 cases of heart were included. The bulk of our series was consisted of the cases aged between 11-90 years old. The average age was 23.75 years. Maximum no. of cases present between the age group of 41-60 years (Table 1).

Out of 115 cases 98(85.21%) were male and 17(14.78%) were female. There was a remarkable male dominance (Figure 1).

In histopathological examination the most common finding was atherosclerosis found in 74(64.34%) cases followed by myocardial hypertrophy in 60(52.17%) cases, myocardial infarction in 33 (28.69%), myocarditis in 11(9.56%), vaso-occlusive crisis in sickle cell in 6(5.21%), fatty streaks in 5(4.34%) and pericarditis in 1(0.86%) cases. In 29 cases, no specific pathological findings are identified during gross and microscopic examination (Table 2).

Out of 115 cases, 74 cases shows atherosclerotic changes. Among 74 cases of atherosclerotic changes 13 cases are having calcification and 4 cases were present with thrombus in coronaries (Table 3).

Out of 115 cases, 33 cases shows myocardial infarction. Out of 33 cases of myocardial infarction, 15 cases shows old infarct, whereas 17 cases shows features of recent infarction (Table 4).

Out of 60 cases of myocardial hypertrophy, 37 cases shows both right and left ventricular hypertrophy and 1 case shows only right ventricular hypertrophy (Table 5).

DISCUSSION: Investigations in the cases of sudden death take an important place in forensic practice. Medical examiners are often confronted with normal deaths of subjects without any prior medical history and found dead under apparently natural circumstances. However, even a complete autopsy including toxicological analyses, some of them remain unexplained.[17]

In the worldwide, sudden death occur dominantly in males. In present study males were 85.21%, while 14.78% cases were females (Figure 1). The male dominance was reported by other authors Bora Ozdemir et al.[18] reported 73% male and 27% female, Ramazan Karanfil et al.[19] reported 74% male and 26% female and Thomas AC, Knapman PA et al.[20] reported ischemic heart disease accounted 59% of the sudden deaths in 65% men and 41% women.

The cases were differing in a range of 11 to 90 years of age. Most of the cases were in between 41 to 60 years of age (Table 1). Similar findings were reported by Ramazan Karanfil et al.[19] 17 to 78 years and Stavroula A et al.[21] less than 15 to more than 75 years of age.

In comparison of histopathological findings in our study coronary atherosclerosis was most common finding present in 64% of cases (Table 2). Similar findings were reported by Ramazan Karanfil et al.[19] 75%, Stavroula A et al.[21] 77%, Bora Ozdemir et al.[18] 42% Cristina Basso et al.[22] 21%, Drory et al.[23] 58% and Domenico Corrado et al.[24] 18.4% in athletes and 16.4% in non-athletes. Calcification was present in 17% of cases in this study, whereas thrombus was present in 5% of cases (Table 2). Bora Ozdemir et al.[18] reported coronary thrombosis in 4.8% cases.

The next common lesion in present study was myocardial hypertrophy in 52% cases (Table 2). In the literature, myocardial hypertrophy was reported by Bora Ozdemir et al.[18] 17%, Ramazan Karanfil et al.[19] 66%, Cristina Basso et al.[21] 7% Wang HY et al.[25] 7% and Tabib A, Loire R et al.[26] 14.5%. Hypertrophic cardiomyopathy was reported by Domenico Corrado et al.[24] in athletes 2% and in non-athletes 7.3%.

Myocardial infarction was present in 28% cases (Table 2), similar findings were reported by Bora Ozdemir et al.[18] 26%, and Ramazan Karanfil et al.[19] 48% which was higher than this study. Wang HY, Zhao H, et al.[25] reported 7% cases with ischemic heart disease in which fresh or old foci of myocardial infarction were found which was lower than present study.

In present study myocarditis was found in 9% cases (Table 2). Similar findings were reported by Cristina Basso et al.[22] 10%, Bora Ozdemir et al.[18] 7%. Other authors Drory et al.[22] reported 25% and Kramer et al.[27] 29%, which are higher than present study. Wang HY, Zhao H, et al.[25] reported lymphocytic myocarditis in 38% cases with focal myocardial necrosis or degeneration and 10% cases with neutrophil myocarditis accompanied with focal myocytolysis.

In 5.21% cases sickle shaped red blood cells were found in blood vessels shows vaso-occlusion of the small vessels (Table 2). Sickle cell disease was a vaso-occlusive haemoglobinopathy, which may cause myocardial infarction. On literature left ventricular failure found in 0.4% cases of sickle cell disease patients. The other findings reported by same author were myocarditis in 3.3%, myocardial micro-infarct in 20%, and congestive heart failure in 9.9% of cases of sickle cell disease patients (Elizabeth A Manci, et al.).[28]

In present study pericarditis was found in 0.86% cases. Primary pericarditis is uncommon; in most cases it is caused by infection. Viruses are usually responsible.[29] No literature was available related to pericarditis.

Sl. No.	Range of Age in Years	No. of Patients	%
1	0-10	0	0
2	11-20	5	4.35
3	21-30	13	11.30
4	31-40	16	13.91
5	41-50	33	28.70
6	51-60	34	29.56
7	61-70	10	8.7
8	71-80	2	1.73
9	81-90	2	1.73
Total		**115**	**100**

Table 1: Age wise distribution of cases

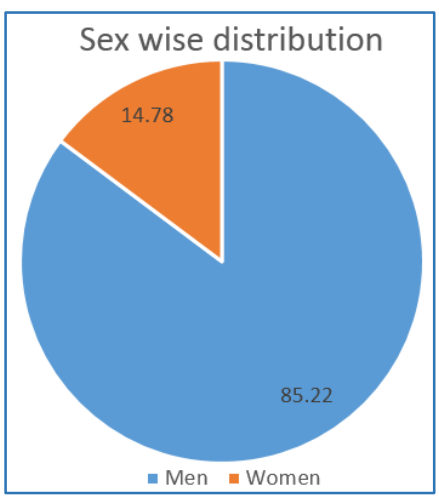


Fig. 1: Sex wise distribution of cases (In percent)

Sl. No.	Findings	No. of Cases	% (out of 115 cases)
1	Atherosclerosis	74	64.34
2	Myocardial infarction	33	28.69
3	Myocarditis	11	9.56
4	Myocardial hypertrophy	60	52.17
5	Pericarditis	01	0.86
6	Sickle cell	06	5.21
7	Fatty streaks	05	4.34
8	No specific findings	29	25.21

Table 2: Histopathological findings

Sl. No.	Findings	No. of Cases	%
1	Atherosclerosis	57	77.02
2	Atherosclerosis with calcification	13	17.56
3	Atherosclerosis with thrombus	04	5.40

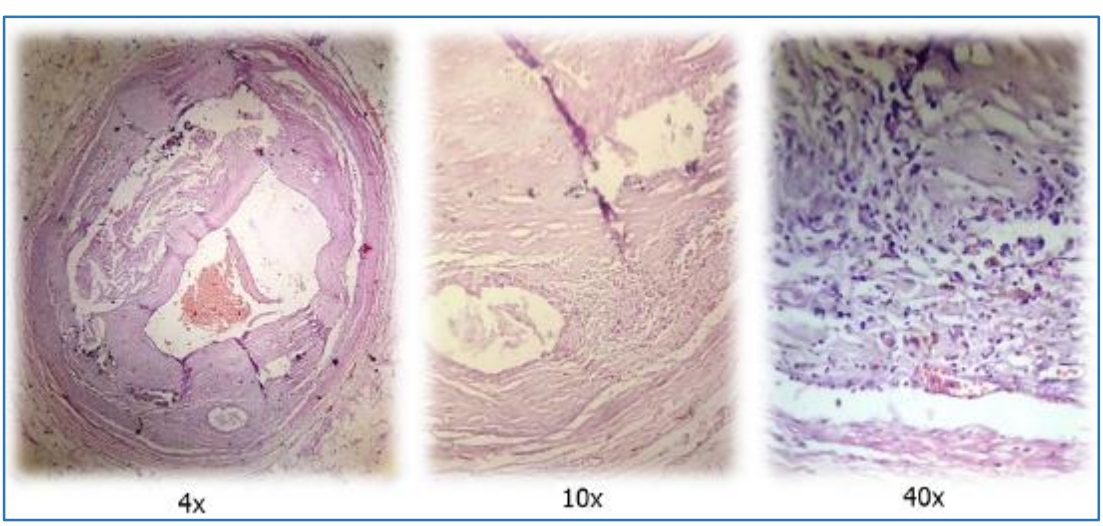
Table 3: Changes in coronaries (Out of 74 cases)

Sl. No.	Myocardial Infarction	No. of Cases
1	Old	15
2	Recent	17

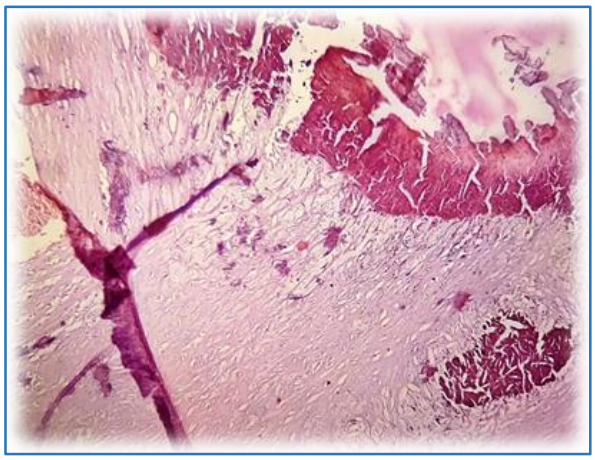
Table 4: Types of myocardial infarction

Sl. No.	Myocardial Hypertrophy	No. of Cases
1	LVH	22
2	RVH	01
3	LVH + RVH	37

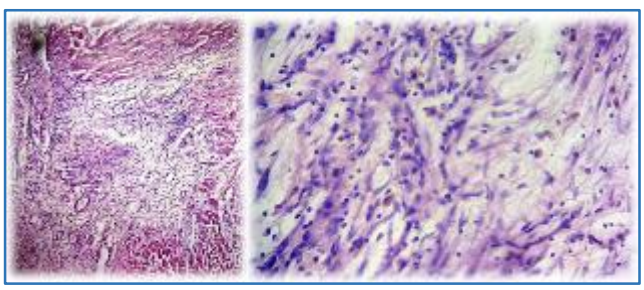
Table 5: Types of myocardial hypertrophy (Out of 60 cases)



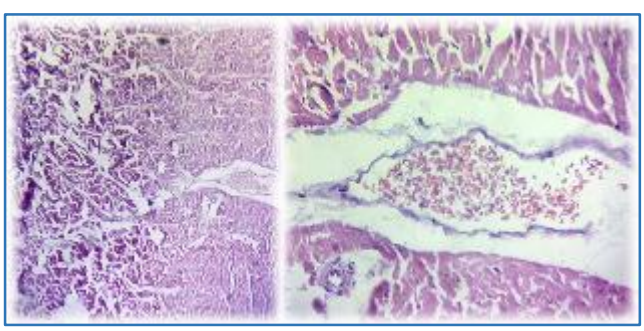
Photomicrograph 1: Atheromatous plaque in the coronary artery (4x, 10x, 40x). In 4x, overall architecture demonstrating fibrous cap and a central necrotic (largely lipid). The lumen has been narrowed. In 10x and 40x showing scattered inflammatory cells, calcification and neovascularization



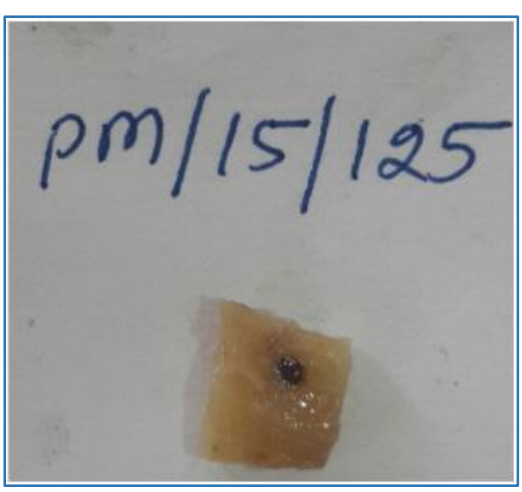
Photomicrograph 2: Medial calcification (10x)



Photomicrograph 3: Myocarditis (10x, 40x)



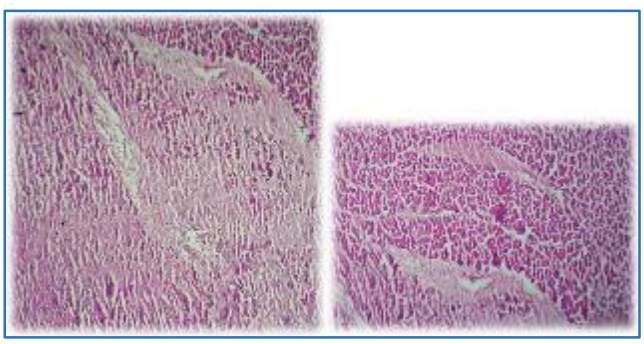
Photomicrograph 4: Sickle shaped red blood cells inside the vessel (10x, 40x)



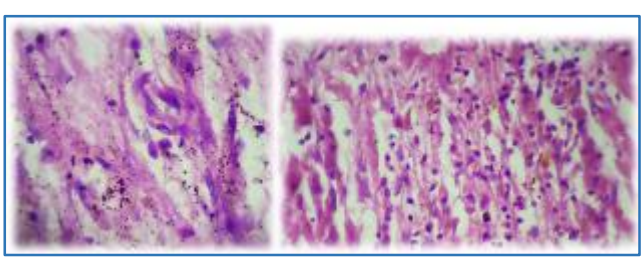
Photomicrograph 5: Gross feature of coronary artery (Occluded)

Photomicrograph 6: Shows left ventricular hypertrophy (Gross)

Photomicrograph 7: Shows fatty streak in aorta (Gross)



Photomicrograph 8: Shows areas of myocardial infarction H&E (10X)



Photomicrograph 9: Shows features of myocardial infarction, coagulative necrosis, inflammatory infiltrate and macrophages. H&E (40X)

CONCLUSION: Present study was concluded that the most frequent lesion in the heart cases were atherosclerosis. Atherosclerosis was the main cause of myocardial infarctions and sudden death. In sudden deaths, cause of death can be determined by autopsy but routine autopsy procedure is not sufficient. So in medicolegal autopsies, especially for sudden death it is proposed that every possible organ must be sampled for histopathological examination and must be evaluated with a multidisciplinary approach (scene investigation, medical history, biochemical, microbiological, toxicological, etc.). When sudden death occurs in adults and elderly persons coronary atherosclerosis is the usual cause, but in young sudden death may occur due to congenital and acquired cardiovascular diseases. Molecular studies are required for these cases. Hence, with these investigations

cause of death can be accurately determined in sudden death cases.

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