

A Study of Etiology & Pattern of involvement of coronary artery in young subjects with sudden death cases in Kolkata

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Abstract: In the present study we assessed is the pattern of involvement of coronary artery in young subjects (<35 yrs) with sudden death coming for autopsy in Kolkata police morgue. In randomly selected 97 cases of sudden death was selected and post mortem examination was conducted to find out the cause of death, Histopathological examination was taken as an additional tool for reaching a proper diagnosis in selected cases

Results: Among the total cases 57.7% death were due to cardiac involvement out of which 83.9% were due to involvement of one or more major coronary arteries, 76.6% cases were due to atherosclerotic involvement and 23.4% disease was of non atherosclerotic origin. The study reveal anomalous origin of coronary artery in 45.5% cases, long intramural coarse of the main coronary artery were seen in 36.4% cases with SCAD & Takayasu disease contributed in 18.2% cases. In our study LAD involvement were seen 55.6% cases as RCA & CX involvement were 27.8% & 11.1% respectively in atherosclerotic coronary artery disease, in non atherosclerotic coronary artery disease LAD were predominant in 81.8% cases.

Key words: Sudden death, Kolkata police morgue, coronary artery, SCAD, Takayasu's disease, LAD, RCA, CX

I. Introduction

Sudden death have been define in the literature as a death of an individual not known to be suffering from any pre existing disease, injury or poisoning succumbs to his illness within 24 hrs of onset of terminal illness. Some authorities however have advocated the time limit to be 1 hr duration. Never the less among the several causes attributable to the sudden death, sudden cardiac death remains the most important one attributing more than 50% of the cases. A study conducted by Mayar L , Sutubbs et.al in a 30yrs old review among children & young adult of 0-35yrs of ages suggested that the coronary artery disease (CAD) remaining as the major contributor in 42.9% of the cases among the age group of 25-35 yrs. The modern era has notice an enormous increase in the incidence of SCD in young individual. As per the US statistics 1 in 2 lakhs athletes suffer from SCD , in a yr. Males outnumber females in the incidence rate with 2/3 rd cases occur in football & baseball players.

Atherosclerosis remains the major contributor of worldwide of CAD involving all races and ethnicity; however rate of non atherosclerotic diseases is increasing day by day to worsen the picture particularly among the young subjects. In US 80% SCD is due to CAD , 10-15% due to myopathy mostly due to HOCM and in 5-10% cases no structural changes were found. Data obtained from forensic medical examiner on 2348 cases(of which 1891 cases where fully characterized sudden death) 50% of SCD was due to CAD , 38% was due to cardiac disease of non coronary origin & 5% obtained in morphologically normal heart.

Hill & Shpeard collected a database of 1647 heart case in England by autopsy in subjects with non atherosclerotic coronary artery disease with SCD; they suggested it was more prevalent among the young male subjects.

II. Aims & objectives

The aim of the present study is to find out the atherosclerotic & non atherosclerotic involvement of major coronary arteries and their pattern of involvement among the young subjects.

III. Material & Methods

The present study is a cross sectional prospective study with randomly selected cases of sudden deaths was taken as study .Prior to the commencement of the study ethical clearance is obtained from the institutional ethical committee.

Inclusion criteria:

- 1) Young cases (<35 yrs) subjected to sudden cardiac death.

Exclusion criteria:

- 1) Ages >35 yrs.
- 2) Stage of advance decomposition.

IV. Study design & Technique

Randomly selected 97 cases of sudden death in young subjects were selected after doing the meticulous PM exam to ascertain the cause of the death, 56 cases were taken where death was due to cardiac involvement. Dissection of the heart was carried out in the usual manner along the line of flow of blood and subsequently the course of the coronary arteries was meticulously analyzed to look for any pathological process like thrombus, embolus, atherosclerotic narrowing, minor congenital defect at its origin and along its course etc. Among the sudden cardiac death cases of the selected subject 47 were due to involvement of one or more coronary artery, 3 cases were due to myopathy particularly HOCM and 4 cases were due to valvular heart disease. Among the 47 cases of coronary artery disease, 36 were due to atherosclerotic coronary artery disease and rests were due to non atherosclerotic coronary artery disease. Congenital defects in the coronary artery particularly at its origin and during its course mostly long intramural course were found in 11 cases of non atherosclerotic CAD.

Spontaneous Coronary Artery Dissection and vasculitis (takayasu's disease) was diagnosed in the remaining case after proper H.P examination.

V. Results & analysis

The data collected in the above mentioned process was subsequently analyzed through SPSS (version 21) to obtain the following results. Among the total cases (n=97), 57.7% were deaths due to cardiac involvement (SCD) (n=56), 30.9% death cases were due to disease process involving lungs (n=30), 9.3% cases were due to central nervous system involvement (n=9) & gastrointestinal involvement contributing to the remaining 2.1% cases (n=2).

Among the SCD cases 83.9% were due to the involvement of one or more major coronary artery disease (CAD) 5.4% cases were due to Cardiomyopathy, valvular heart disease contributed in 7.1% cases, where as 3.6% cases were attributed to the other causes like cardiac arrhythmias.

Among the cases involving coronary arteries 76.6% were due to atherosclerotic coronary artery disease where as the remaining 23.4% were due to some non atherosclerotic disease process.

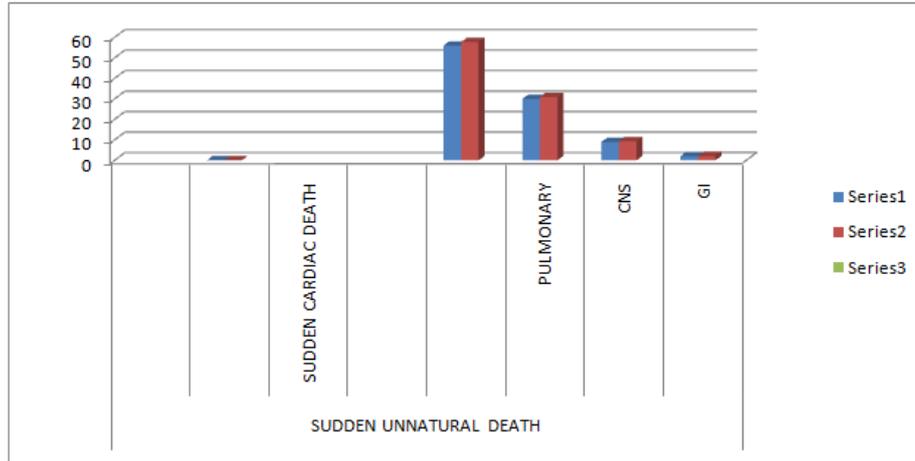
Among the different cases non atherosclerotic CAD, the study reveals an anomalous origin of the main coronary artery involved in 45.5% cases. A long intramural course of the main coronary artery were seen in 36.4% cases with spontaneous coronary artery dissection (SCAD) & Takayasu's aortoarteritis involving coronary artery contributed the remaining percentage of cases (18.2%).

Regarding the definitive pattern of arterial involvement in relation to the atherosclerotic CAD, left anterior descending artery involvement were seen in 55.6% cases, 27.8% deaths were due to involvement of RCA, 11.1% were due to involvement circumflex artery, where as marginal artery involvement was noticed in 5.6% cases.

In relation to the non atherosclerotic CAD cases left anterior descending branch were predominantly involved in 81.8% cases, where as in 18.2% cases the process involves RCA.

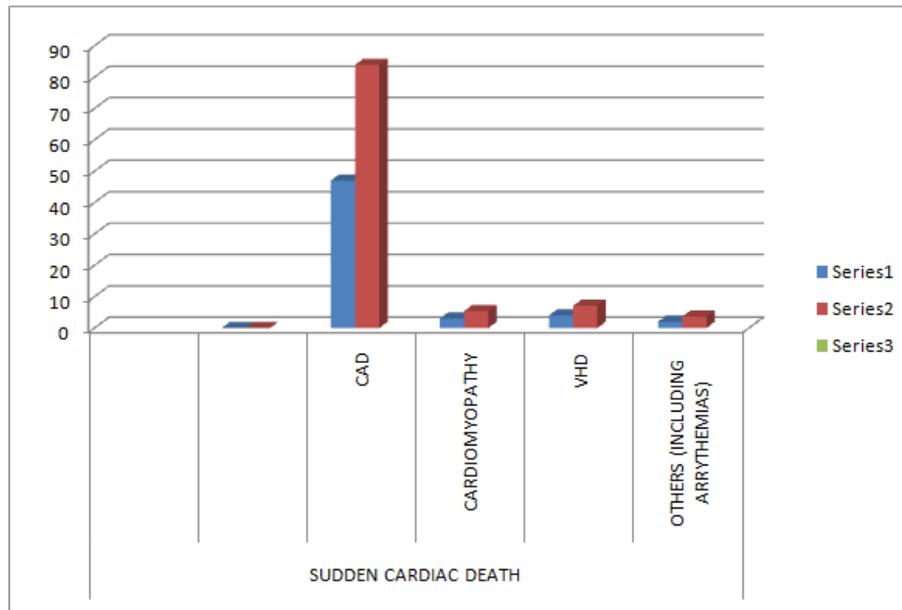
Sudden Unnatural Death

	Frequency	Percent	Valid Percent	Cumulative Percent
Sudden Cardiac Death	56	57.7	57.7	57.7
Pulmonary	30	30.9	30.9	88.7
Cns	9	9.3	9.3	97.9
Gi	2	2.1	2.1	100.0
Total	97	100.0	100.0	



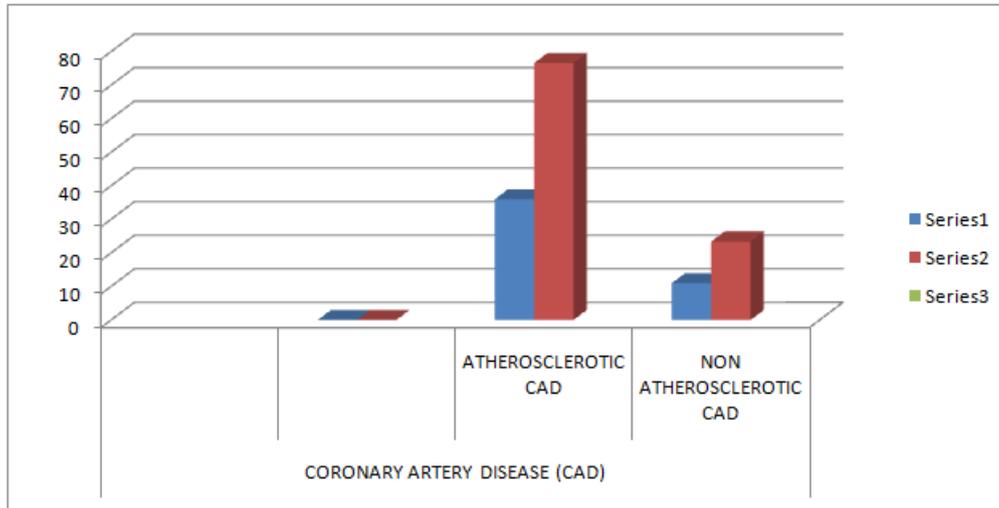
Sudden Cardiac Death

	Frequency	Percent	Valid Percent	Cumulative Percent
Cad	47	83.9	83.9	83.9
Cardiomyopathy	3	5.4	5.4	89.3
Vhd	4	7.1	7.1	96.4
Others (Including Arrythemias)	2	3.6	3.6	100.0
Total	56	100.0	100.0	



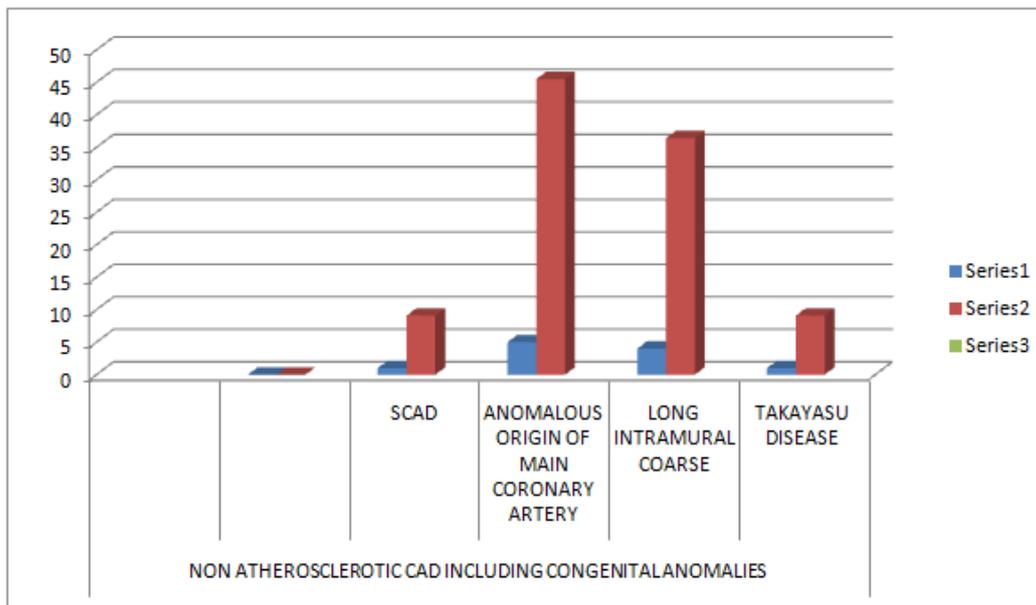
Coronary Artery Disease (Cad)

	Frequency	Percent	Valid Percent	Cumulative Percent
Atherosclerotic Cad	36	76.6	76.6	76.6
Non Atherosclerotic Cad	11	23.4	23.4	100.0
Total	47	100.0	100.0	



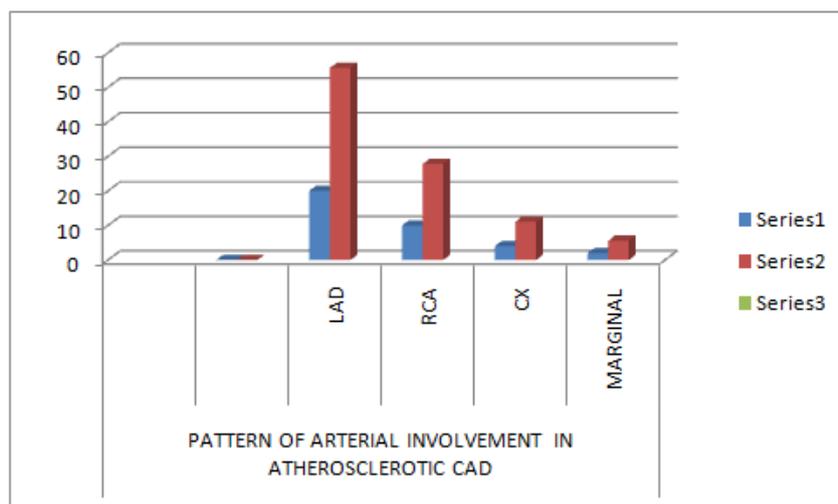
Non Atherosclerotic Cad Including Congenital Anomalies

	Frequency	Percent	Valid Percent	Cumulative Percent
Scad	1	9.1	9.1	9.1
Anomalous Origin Of Main Coronary Artery	5	45.5	45.5	54.5
Long Intramural Coarse	4	36.4	36.4	90.9
Takayasu Disease	1	9.1	9.1	100.0
Total	11	100.0	100.0	



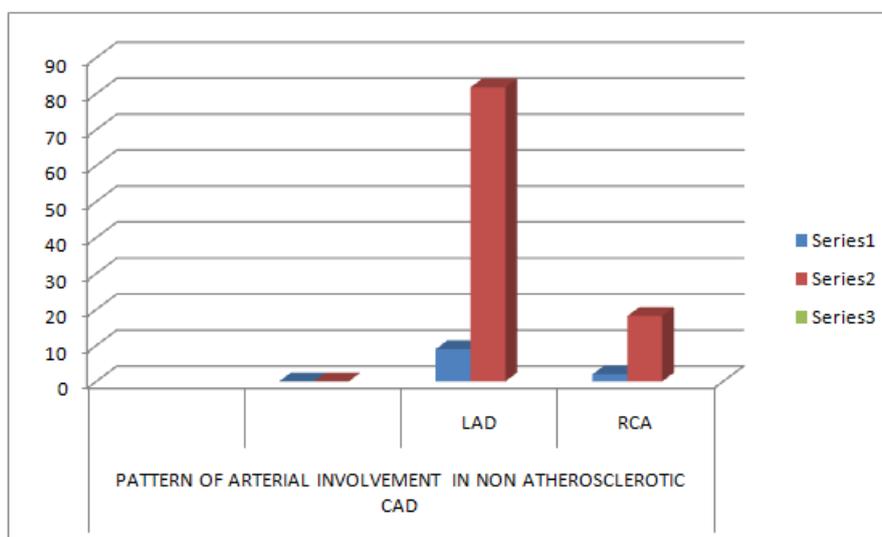
Pattern Of Arterial Involvement In Atherosclerotic Cad

	Frequency	Percent	Valid Percent	Cumulative Percent
Lad	20	55.6	55.6	55.6
Rca	10	27.8	27.8	83.3
Cx	4	11.1	11.1	94.4
Marginal	2	5.6	5.6	100.0
Total	36	100.0	100.0	



Pattern Of Arterial Involvement In Non Atherosclerotic Cad

	Frequency	Percent	Valid Percent	Cumulative Percent
LAD	9	81.8	81.8	81.8
RCA	2	18.2	18.2	100.0
Total	11	100.0	100.0	



VI. Discussion

In our study, cardiac involvement or SCD remains the most common cause of death in young adults responsible for 57.7% of SUND cases, followed by involvement of other major systems namely pulmonary, CNS & GI systems respectively. However a clinico-pathological study by MADHU CHATURVADI et al. in the dept. of pathology LTM general hospital & municipal medical college, MUMBAI, INDIA shows a predominance of non-cardiac cases over the cardiac cases (73.4% vs. 7.8%) in sudden unexpected & natural deaths in young adults.

Among the SCD cases, CAD remains the most common etiology followed by other causes like cardiomyopathy mostly HOCM, valvular heart disease & cardiac arrhythmias. In respects to the CAD, atherosclerotic involvement of one or more coronary arteries exceeds the nonatherosclerotic disease process (76.6% vs. 23.4%). Among the different causes of nonatherosclerotic CAD we found a wider range of abnormalities including anomalous origin of one or more coronary trunk where noticeable findings. These conditions along with myocardial bridging of coronary arteries were long regarded as anatomical variants, however recent studies have found out their contribution in myocardial ischemia & infraction. A study by FARUQHI et al reported a significant improvement in ischemic symptoms after surgical intervention involving bridging coronary arteries. In respect to the long course of intramural coronary artery in precipitating fetal

myocardial ischemia during an unaccustomed strenuous exercise was studied by MORALES et al. Their observation was that there was an ischemic damage at various stages of healing in the myocardial territory supplied by the intramural coronary artery. In an index case spontaneous dissection of coronary artery was the contributing factor where as the histology of the affected segment diagnosed one case as Takayasu's aorto arteritis.

In respect to the pattern of arterial involvement in relation to the atherosclerotic CAD 55.6% cases were due to LCA , 27.8% cases RCA were involved were as in 11.1% circumflex artery were affected. In 2 cases (5.6%) marginal artery was the offending artery, In a study NOOR L, SHAW SS et al in sub continental population in Peshwar, Pakistan on young subject (<35 yrs) left coronary artery involvement was observed in 50% cases, right coronary artery and circumflex was involved in 25% and 20% respectively.

In term of arterial involvement pattern in case of non atherosclerotic coronary artery disease we observed LCA involvement in 81.8% of the cases where as RCA was involved in 18.2% cases.

Conflicts of interest: None.

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