Study of Right Marginal Artery in Post Mortem Hearts of Adult Bangladeshi People

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Postmortem heart, Coronary arteries, Right marginal artery.

Abstract

Background: *Heart disease is one of the major public health problems in Bangladesh. Treatment of heart disease is costly & complex issue. The study of anatomy of the right marginal artery is essential for the proper diagnosis and treatment of the heart diseases.*

Materials: *The study was carried out in the Department of Anatomy, Dhaka Medical College (DMC), Dhaka from February 2005 to January 2006. Post mortem study of sixty (60) adult human hearts of Bangladeshi people aging from 20 to 75 years was performed. The samples were divided into 3 age groups – Group A (20 to 40 years) consists of 35 males & 7 female, Group B (41 to 60 years) consists of 8 male & 3 female and Group C (61 to 75 years) consists of 7 male. All the samples of different age groups were examined morphologically.*

Results: *In the present study, the right marginal artery was present in 54 and absent in 6, out of 60 samples. Out of 54, the right marginal artery was terminated at the apex in 15 and nearer to the apex in 39 cases.*

Conclusion: *The result of the present study can be helpful to the cardiologists and cardiovascular surgeons for proper anatomical assessment of coronary arteries in patients with heart diseases.*

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Introduction

Cardiovascular diseases a major concern of the people suffering from the diseases as well as of the people related to the health care delivery systems. Considerable decline in the mortality from Ischaemic heart disease or Stroke is noticed in recent times, by bringing about changes in dietary habits and lifestyles, better control of hypertension, recent rapid advances in medical & surgical management and advanced diagnostic technology and better health care delivery system[1].

When we talk about cardiovascular disease, the disease that comes into our mind is ischaemic heart disease (IHD) or coronary heart disease (CHD). This is because of sudden and unexpected fatal consequence; it can produce in an otherwise healthy-looking individual. In 90 percent of cases, the cause of Ischaemic heart disease is reduction in coronary blood flow due to atherosclerosis. Atherosclerosis is a silent disorder that begins in the childhood. Intimal lesions have been found as early as 9 months of age. The disease process of the coronary arteries can proceed to an advanced stage before any symptoms are produced[2].

In the United Kingdom, almost 50 percent of all deaths are attributable to cardiovascular disease, and of these, at least 50 percent are due to CHD. Heart disease is a predominant cause of death and disability in the western affluent industrialized nations. There, it is the commonest cause of death from the 4th decade onwards of life. In the United States, atherosclerosis-related CHD results almost 65,000 fatalities annually. It is noticed with concern that the incidence of coronary heart disease is increasing in the developing countries of South Asia and in Bangladesh[3].

Atherosclerotic related vascular lesions, once produced in the human, cannot be reverted to normal. But atherosclerosis could be inhibited to some extent if preventive measures are taken early. Significant risk factors that predisposes to atherosclerosis are : (a) hyperlipidaemia, (b) hypertension, (c) cigarette smoking and (d) diabetes. These factors vary obviously among populations. Racial and geographic variations in the incidence of aortic and coronary atherosclerosis have also been reported [4].

Recent advances in cardiac surgery and the search for new techniques toward investigation of the heart are demanding a review of the anatomy of the coronary arteries and their branches to provide an updated background for practical

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application. Before trying on sophisticated studies of coronary microcirculation, some basic anatomical studies should be carried out on the heart of Bangladeshi People [5].

Materials and methods:
The present study was performed on sixty (60) postmortem adult human hearts of Bangladeshi people of both sexes. Among them, fifty (50) were male aging from 20 to 75 years and ten (10) were female aging from 20 to 55 years. The samples were divided into three groups (Table-1). All the samples were studied gross morphologically by careful dissection.

The samples for the study were collected from the morgue of the Department of Forensic Medicine of Dhaka Medical College from April 2005 to December 2005. After requisite legal formalities, the samples were collected from unclaimed dead bodies as early as possible, before any sign of putrefaction developed. The sample were washed thoroughly with tap water and gently squeezed to remove the blood clots from the cavity of the heart and from the lumen of the blood vessels as much as possible. Then the sample was brought to the Department of Anatomy of DMC. In the dissection room, the hearts were cleaned by removing all fat and other associated tissue from the surface of the heart. Then the hearts were preserved in 10% formol saline solution.

Table-I
Age distribution in different group

Group	Age range (years)	Male	Female
A	20 to 40	35	7
B	41 to 60	8	3
C	61 to 75	7	0

The formol saline fixed samples were kept in the tap water to wash out the formol saline so as to minimize the irritation of the eyes and also for somewhat softening of the fixed tissue. Then the sample was taken in a tray and with the help of scissors and toothed dissecting forceps, the pericardium, fat and other unwanted tissues were removed carefully so that the heart was exposed properly.

Measurement procedures:
The right marginal artery:
The right marginal artery was observed from its origin whether it arose from the right coronary artery or absent. It was also observed for its termination whether it was at the apex or nearer to the apex (Fig. No.1&2).

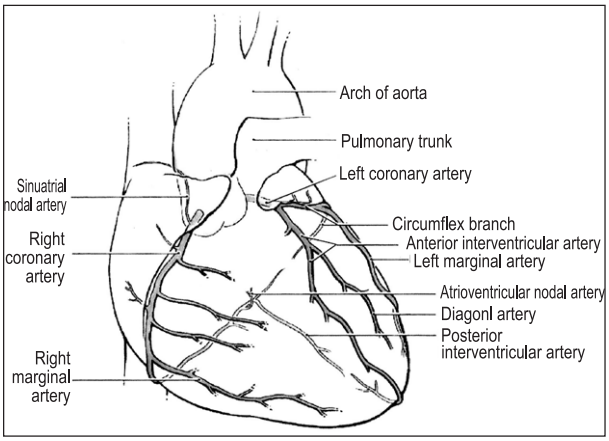

Fig.-1: *Anterior view of coronary arteries (From Agur, 2005)*

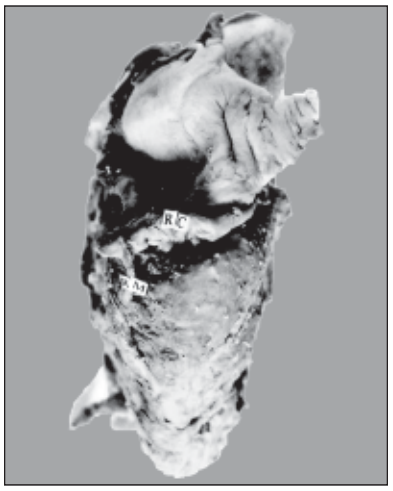

Fig.-2: *Photograph showing the right marginal artery (RC-Right coronary artery, RM- Right marginal artery).*

Statistical processing of data:
Appropriate Statistical Package for Social Science (SPSS), such as, Chi-square test, to evaluate significance of variance of the different findings were done.

Results:
The present study was performed on sixty (60) adult postmortem human hearts of Bangladeshi people. Among them fifty (50) were males aging from 20 to 75 years and ten (10) were female's aging from 20 to 55 years. All the samples were divided into 3 age groups: Group A (20 to 40 years), Group B (41 to 60 years) and Group C (61 to 75 years). All the samples were studied gross morphologically.

Existence of the right marginal artery
In-group A, the right marginal artery was present in 32 (91.4%) and absent in 3 (8.6%) in male and in

female was present in 6 (85.7%) and absent in 1 (14.3%) samples. In-group B, the right marginal artery was present in 7 (87.5%) and absent in 1 (12.5%) in male and in female was present in 3 (100%) samples. In-group C, the right marginal artery was present in 6 (85.7%) and absent in 1 (14.3%) in male samples. Statistical analysis between sex did not show any significant difference (P>0.50, P>0.10) [Table 2, Fig.1&2].

Site of termination of the right marginal artery: In-group A, the right marginal artery was terminated at the apex in 9 (28.1%) & nearer to the apex in 23 (71.9%) in male and in female was terminated at the apex in 1 (16.7%) & nearer to the apex in 5 (83.3%) samples. In-group B, the right marginal artery was terminated at the apex in 2 (28.6%) & nearer to the apex in 5 (71.4%) in male and in female was terminated at the apex in 1 (33.3%) & nearer to the apex in 2 (66.7%) samples. In-group C, the right marginal artery was terminated at the apex in 2 (33.3%) & nearer to the apex in 4 (66.7%) in male samples. Statistical analysis between sex did not show any significant difference (P>0.50, P>0.50), [Table 3, Fig.1&2].

Table-II

Existence of right marginal artery (n=60)

Group	n	Present		Absent		P value
		No.	(%)	No.	(%)	
Male						
A	35	32	(91.4)	3	(8.6)	
B	8	7	(87.5)	1	(12.5)	$>0.50^{ns}$
C	7	6	(85.7)	1	(14.3)	
Female						
A	7	6	(85.7)	1	(14.3)	
						$>0.10^{ns}$
B	3	3	(100.0)	0		

Statistical analysis done by Chi square test
Group A : Age 20 40 years
Group B : Age 41 60 years
Group C : Age 61 75 years
ns = Not significant

Table-III

Site of termination of right marginal artery (n=60)

Group	n	At the apex		Nearer To the apex		P value
		No.	(%)	No.	(%)	
Male						
A	32	9	(28.1)	23	(71.9)	
B	7	2	(28.6)	5	(71.4)	$>0.50^{ns}$
C	6	2	(33.3)	4	(66.7)	
Female						
A	6	1	(16.7)	5	(83.3)	
						$>0.50^{ns}$
B	3	1	(33.3)	2	(66.7)	

Statistical analysis done by Chi square test
Group A : Age 20 40 years
Group B : Age 41 60 years
Group C : Age 61 75 years
ns = Not significant

Discussion

The present study was performed on sixty (60) adult postmortem human hearts of Bangladeshi people. Among them fifty (50) were male aging from 20 to 75 years and ten (10) were female aging from 20 to 55 years. All the samples were divided into 3 age groups: Group A (20 to 40 years), Group B (41 to 60 years) and Group C (61 to 75 years). All the samples were studied gross morphologically.

In the present study, the right margin artery was present for male in-group A, B, C was 32(91.4%), 7(87.5%), 6(85.7%)%), respectively and for female was 6(85.7%), 3(100%), respectively and absent for male in-group A, B, C was 3(8.6%), 1(12.5%), 1(14.3%), respectively and for female was 1(14.3%). In the Bangladeshi peoples, Sarker examined 54 samples and found the right marginal artery was present in about 91% and absents in about 9% cases. Here, the values of the present study were somewhat similar to the values in the study of Sarker.[2]

The right marginal artery was terminated at the apex for male in-group A, B, C were 9(28.1%), 2(28.6%), 2(33.3%), respectively and for female were 1(16.7%), 1(33.3%), respectively and nearer to the apex for male in-group A, B, C were 23(71.9%), 5(71.4%), 4(66.7%), respectively and for female were 5(83.3%), 2(66.7%), respectively.

In the Bangladeshi peoples, Sarker examined 54 samples and found the right marginal artery was terminated at the apex 29.63% and nearer to the apex 61.11%.[2] Here, the values in site of termination of the right marginal artery at the apex of the present study were somewhat similar and nearer to the apex were higher to the values in the study of Sarker. Rahman examined 70 adult human hearts and found the artery in 92.85% cases of which 52.85% reached the apex and 40% nearer to the apex in Bangladeshi people.[3] Here, the values in site of termination of the right marginal artery at the apex of the present study were lower and nearer to the apex were higher to the values in the study of Rahman.

Crainicianu (1922, cited by Baroldi and Scomazzoni, 1967) found the artery in 95% cases of which 65% reached the apex.[12] Mouchet (1933, cited by Baroldi and Scomazzoni, 1967) found the artery in 92% cases of which 55% reached the apex. Gross (1921, cited by Baroldi and Scomazzoni, 1967) found the artery in 94% cases. Baroldi and Scomazzoni (1967) found this artery in 100% cases of which 93% reached the apex and 7% fell short of the apex (nearer to the apex).

Conclusions:

A descriptive postmortem study like the present study can give an overview about the anatomy of the coronary arteries of the Bangladeshi people. However, large sample size is very important in such epidemiological studies. Routine autopsy studies of hospital deaths should be encouraged. Study on living population, including patients of heart diseases, are also important, where various types of investigations like coronary angiogram & CT angiogram may be applied. These findings may then be correlated with postmortem study results in developing a comprehensive epidemiological data pool. These data may be helpful in planning research.

Due to limitation of resources all age groups were not included. Sample size was small. Resin corrosive casts and angiography was not done in present study. Further studies with large sample size with wider age group using Resin corrosive cast and angiography are recommended.

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