

STUDY ON POSTERIOR INTERVENTRICULAR ARTERY IN POST MORTEM HEART OF ADULT BANGLADESHI PEOPLE

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Summary

Context: Heart diseases are the predominant cause of disability and death in Bangladesh. Treatment of heart disease is costly & complex issue. The study of the posterior interventricular artery is essential for the proper diagnosis and treatment of the heart diseases. **Study design:** Descriptive type. **Place & period of study:** The study was carried out in the Department of Anatomy, Dhaka Medical College, Dhaka from February 2005 to January 2006. **Materials:** The present study was performed on sixty (60) adult postmortem human hearts of Bangladeshi people aging from 20 to 75 years. The hearts were collected from unclaimed dead bodies autopsied in the morgue of Dhaka Medical College. **Methods:** The samples were divided into 3 age groups – Group A (20 to 40 years) consists of 35 males & 7 female samples, Group B (41 to 60 years) consists of 8 male & 3 female samples and Group C (61 to 75 years) consists of 7 male samples. All the samples of different age groups were examined gross morphologically. **Results:** The posterior interventricular artery arised from the right coronary artery 90% & from the left coronary artery 10% and was terminated in the distal half of the posterior interventricular groove 67%. **Conclusion:** The results of the present study can be helpful to the cardiologists and cardiovascular surgeons in the proper diagnosis and management of the heart diseases.

Key words

Postmortem Heart; coronary artery; posterior interventricular artery

Introduction

The term coronary refers to the arterial vessels of the heart, whereas the cardiac vessels are mainly venous structures. The term coronary is derived from the Latin term for heart. It also refers to the crown-like (corona) arrangement of the coronary arteries as they encircle the heart in the atrioventricular sulci^{1,2}.

The coronary circulation consists of the blood vessels that supply blood to the heart. The vessels that supply high-oxygenated blood to the heart are known as coronary arteries. The vessels that remove the deoxygenated blood from the heart are known as cardiac veins. The coronary arteries that run on the surface of the heart are called epicardial coronary arteries. These arteries, when healthy, are capable of autoregulation to maintain coronary blood flow at levels appropriate to the needs of the heart muscle. These vessels are commonly affected by atherosclerosis and can become blocked, causing angina or a heart attack^{3,4}.

The exact anatomy of the myocardial blood supply varies considerably from person to person. A full anatomy of the coronary arteries are required in cardiac catheterization. In general there are two main coronary arteries, the left and right. Both of these arteries originate from the beginning (root) of the aorta, immediately above the aortic valve. The left coronary artery originates from the left posterior aortic sinus, while the right coronary artery originates from the anterior aortic sinus^{3,5}.

Bangladesh is a developing country has many health problems. Bangladesh is turning rapidly towards industry based settings with her vast population and poverty stricken agro based background. As a result the life-style and food habits of the people have been changed. Most of the people are engaged in less physical activities. Rich food is taking the place of many less atherogenic food products. Various problems are also causing increasing amount of anxiety and tension among our people. Added to all these are the population booms, which means many more patients of any kind in absolute terms. Previously some communicable diseases were the principal causes of death in the poor countries like ours. With some advancement in the community health care facilities, increased awareness of the people and availability of the drugs against those diseases, other forms of diseases are taking their place. Heart disease is one of them. It is generally assumed that various sorts of problems are growing day by day which are increasing the anxiety and tension of the mankind. There have been changes in the life style of many people in these countries because of industrialization and consequent urbanization of the society⁶.

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It is to be mentionable here that when we talk about cardiovascular diseases, the disease that comes into our mind is ischaemic heart disease (IHD) or coronary heart disease (CHD). This happens due to sudden and unexpected fatal consequences, it can produce in an otherwise healthy-looking individual. The cause of IHD is reduction in coronary blood flow due to coronary atherosclerosis in 90 percent cases. The incidence of coronary heart disease is increasing in the developing countries of South Asia and in Bangladesh. The epidemiological status of the Bangladeshi people regarding cardiovascular disorders is yet to be established. During the year 2004, 21797 patients were admitted in the National Institute of Cardiovascular Diseases (NICVD). PTCA (Percutaneous Transmural Coronary Angiogram) 4482, PCI (Percutaneous Coronary Intervention) 599, PTMC (Percutaneous Transmural Mitral Commissurotomy) 273, Temporary Pacing 715, Permanent Pacing 333, Closed Heart Surgery 95, Open Heart Surgery 561, CABG (Coronary Artery Bypass Grafting) 180, Balloon Valvuloplasty (pulmonary and aortic) 159, Device Closure of congenital heart disease 205 and Vascular Surgery 300 were done in the NICVD during the year 2004. Still, it may be assumed that many more remains improperly treated, untreated or even undiagnosed^{7,8}.

Apart from the possible variations in the distribution pattern of the coronary arteries, there may be variations in the size of different coronary arteries and their branches. This is because there may be racial variations in different dimensions of human heart. Similar variations have been found in other organs as well. As in most cases the dimension of the coronary arteries are expected to be correlated to the heart dimension the possible racial variation in arterial size also remains a matter of interest^{9,10}.

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 application. Before trying on sophisticated studies of coronary microcirculation, some basic anatomical studies should be carried out on the heart of Bangladeshi People¹¹.

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 morphologically.

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 a scissors and toothed dissecting forceps, the pericardium, fat and other unwanted tissues were removed carefully so that the heart was exposed properly.

Measurement procedures

Site of origin & termination of the posterior interventricular artery

The posterior interventricular artery was observed from its origin whether it arose from the right coronary artery or the left coronary artery and for its termination whether at the apex or in the middle of the posterior interventricular groove or in the distal part of the posterior interventricular groove of the heart (Photo. 1, 2 & 3).

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 morphologically.

1) Site of origin of the posterior interventricular artery

In-group A, the posterior interventricular artery arised from the right coronary artery in 32 (91.4%) & from the left coronary artery in 3 (8.6%) in male and in female was arised from the right coronary artery in 6 (85.7%) & from the left coronary artery in 1 (14.3%) samples. In-group B, the posterior interventricular artery arised from the right coronary artery in 7 (87.5%) & from the left coronary artery in 1 (12.5%) in male and in female was arised from the right coronary artery in 3 (100%) samples. In-group C, the posterior interventricular artery arised from the right coronary artery in 6 (85.7%) & from the left coronary artery in 1 (14.3%) in male samples. Statistical analysis between sex did not show any significant difference ($P>0.50$, $P>0.10$) [Table II, photo.1, 2, 3].

2) Site of termination of the posterior interventricular artery

In-group A, the posterior interventricular artery terminated in the distal half of the posterior interventricular groove in 28 (80%), in the proximal half of the posterior interventricular groove in 6 (17.1%) & at the apex in 1 (2.9%) in male and in female terminated in the distal half of the posterior interventricular groove in 5 (71.4%), in the proximal half of the posterior interventricular groove in 1 (14.3%) & at the apex in 1 (14.3%) samples. In-group B, the posterior interventricular artery was terminated in the distal half of the posterior interventricular groove in 5 (62.5%), in the proximal half of the posterior interventricular groove in 2 (25%) & at the apex in 1 (12.5%) in male and in female was terminated in the distal half of the posterior interventricular groove in 2 (66.7%), in the proximal half of the posterior interventricular groove in 1 (33.3%) samples. In-group C, the posterior interventricular artery terminated in the distal half of the posterior interventricular groove in 4 (57.1%), in the proximal half of the posterior interventricular groove in 2 (28.6%) & at the apex in 1 (14.3%) in male samples. Statistical analysis between sex did not show any significant difference ($P>0.50$, $P>0.50$) [Table III, photo. 1, 2, 3].

Table II : Site of origin of the posterior interventricular artery

Group	n	Site of origin		P value
		RCA No.	LC No.	
Male				
A	35	32	3	>0.50 ^{ns}
B	8	7	1	
C	7	6	1	
Female				
A	7	6	1	>0.10 ^{ns}
B	3	3	0	

Statistical analysis done by Chi-square test

RCA = Right coronary artery

LCA = Left coronary artery

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 the posterior interventricular artery

Group	n	Site of termination			P value
		In the distal half of the posterior interventri- cular groove No.	In the proximal half of the posterior interventri- cular groove No.	At the apex No.	
Male					
A	35	28 (80.0)	6 (17.1)	1 (2.9)	>0.50 ^{ns}
B	8	5 (62.5)	2 (25.0)	1 (12.5)	
C	7	4 (57.1)	2 (28.6)	1 (14.3)	
Female					
A	7	5 (71.4)	1 (14.3)	1 (14.3)	>0.50 ^{ns}
B	3	2 (66.7)	1 (33.3)	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



Photo. 1. Photograph showing the right & left coronary artery with their branches (AA= Ascending aorta, R= Right coronary artery, L= Left coronary artery, N= Nodal artery, A= Anterior interventricular artery, P= Posterior interventricular artery, = Anastomosis between Right & Left Coronary arteries near the apex, = Anastomosis between Right & Left Coronary arteries at the Crux).



Photo. 2. Photograph showing the diaphragmatic surface of the heart, the posterior interventricular artery arising from the right coronary artery (R= Right coronary artery, C= Circumflex artery, P= Posterior inter-ventricular artery, = Anastomosis between Right & Left Coronary arteries near the apex, = Anastomosis between Right & Left Coronary arteries at the Crux).



Photo. 3. Photograph showing the diaphragmatic surface of the heart, the posterior interventricular artery arising from the left coronary artery (R= Right coronary artery, C= Circumflex artery, P= Posterior interventricular artery).

Discussion

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 morphologically.

1) Site of origin of the posterior interventricular artery

In the present study, the posterior interventricular artery arising from the right coronary artery 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 from the left coronary artery 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, Sarker³ examined 54 adult human hearts and found the posterior interventricular artery was arised from the right coronary artery 87% and from the left coronary artery 9%. Here, the values of the present study were somewhat similar to the values in the study of Sarker. Rahman⁵ examined 70 adult human hearts and found the posterior interventricular artery arising from the right coronary artery 78.57%, from the left coronary artery 17.14% and from both

4.28%. Here, the values in site of origin of the posterior interventricular artery from the right coronary artery of the present study were higher and from the left coronary artery were lower. Kalpana¹² stated that the posterior interventricular artery arose from the right coronary artery in 89% and from the left coronary artery in 11% of the samples.

Crainicianu found that the posterior interventricular artery arose from the right coronary artery in 90% and from the circumflex artery in 10% of the samples¹³.

2) Site of termination of the posterior interventricular artery

In the present study, the posterior interventricular artery was terminated in the distal half of the posterior interventricular groove for male in-group A, B, C was 28(80%), 5(62.5%), 4(57.1%), respectively and for female was 5(71.4%), 2(66.7%), respectively, in the proximal half of the posterior interventricular groove for male in-group A, B, C was 6(17.1%), 2(25%), 2(28.6%), respectively and for female was 1(14.3%), 1(33.3%), respectively and at the apex for male in-group A, B, C was 1(2.9%), 1(12.5%), 1(14.3%), respectively and for female was 1(14.3%), nil, respectively.

In the Bangladeshi peoples, Sarker⁶ examined 54 adult human hearts and found that the posterior interventricular artery terminated 11% at the apex, 62.97% in the distal half of the posterior interventricular groove and 22.22% in the proximal half of the posterior interventricular groove. Here, the values of the present study were somewhat similar to the values in the study of Sarker.

Scomazzoni¹³ found the artery was terminated 43% at the apex, 48% in the distal half of the posterior interventricular groove and 9% in the proximal half of the posterior interventricular groove. Here, the values in site of termination of the posterior interventricular artery at the apex of the present were lower; in the distal half of the posterior interventricular groove were higher and in the proximal half of the posterior interventricular groove were higher.

Disclosure

All the authors declared no competing interestes

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