ATHEROSCLEROSIS IN RELATION TO FAT PENNICULUS (OBESITY) BETWEEN XIPHOID AND UMBILICUS

Amjad Naeem, Ruhila Hanif*

Department of Pathology, Akhtar Saeed Medical College, Lahore, *Department of Biochemistry, Ayub Medical College, Abbottabad, Pakistan

Background: It has been shown that possible influence of body weight is more evident for coronary than aortic atherosclerosis; and more in men than women. Coronary heart disease due to obesity in males becomes significant when body mass index (BMI) exceeds 30 (30% overweight) and does not affect the life expectancy particularly in women. This study was conducted to asses the relation of thickness of fat penniculus (obesity) between xiphoid and umbilicus to different atherosclerotic lesions; and to collect basic data about age and sex distribution of this relation. **Methods:** It was prospective descriptive study and conducted at mortuary of King Edward Medical University, and Department of Pathology, Allama Iqbal Medical College, Lahore. A total of 130 human autopsies were carried out in one-and-a-half year of study duration. The ages of the deceased ranged between 8 and 85 years. Heart aorta and its major branches were included in this study. In addition, fat penniculus between xiphoid and umbilicus was measured and atherosclerosis lesions were categorised and correlated with this parameter. Haematoxylin and Eosin, and different special stains were done in Pathology Department of Allama Iqbal Medical College, Lahore to asses to severity of atherosclerosis lesions. **Results:** The fatty streaks were present in predominantly more cases with Fat Penniculus <20 mm than in asses with Fat Penniculus <10 mm and <30 mm. The fibrolipid plaques, complicated and calcified lesions were present in a dominant number of cases with Fat Penniculus <30 mm on percentage basis. **Conclusion:** Raised lesions were seen more frequently in cases with Fat Penniculus 20 mm to <30 mm than in cases with Fat Penniculus <10 mm and <20 mm thickness.

Keywords: Atherosclerosis, Fat Penniculus, Lesions

INTRODUCTION

It has been shown that possible influence of body weight is more evident for coronary than for aortic atherosclerosis; and more in men than in women.[1] Coronary heart disease due to obesity in males becomes significant when body mass-index exceeds 30 (30% overweight) and does not affect the life expectancy, particularly in women.[2] It is estimated that individuals with optimal weight would have 25% less coronary heart disease than those who are over weight.[3]

MATERIAL AND METHODS

A total of 130 human autopsies were carried out during this study. Ninety were males and 40 were females. The age range was between 8 and 85 years. The autopsies were done in the mortuary of the Kind Edward Medical College, Lahore.

All dead bodies included in this study were examined in the interval which ranged from 4–10 hours between the death and autopsy. The dead bodies of men, women and children were included at random on the basis of availability. In each case the relevant history was obtained from the closest relatives of the deceased. Autopsies were performed. The heart, aorta and its major branches were included in this study.

Autopsy findings

1. Body structure: Large, Medium, Small
2. Fat penniculus between Xiphoid and Umbilicus (mm)
3. Heart, aorta and its major branches were collected

Gross sections of coronary arteries were graded by one of the four scores according to the degree of atheromatous narrowing, Grade-I, up to 25% narrowing, Grade-II, 26–50% narrowing, Grade-III, 51–75% narrowing and Grade-IV greater than 75% narrowing. Complete occlusion with haemorrhage, ulceration, thrombosis and calcification were recorded separately. In addition, major degree of narrowing in each branch was noted; isolated areas of narrowing were specified as 'Focal' and distance from origin of artery was noted. In all 130 autopsies aorta, coronary arteries, and renal arteries were examined. In 30 cases besides these three types of arteries the other major branches of aorta were also included in this study. One to 4 sections were taken from aorta for histological examination from the following sites.

1. Arch of aorta.
2. Above the celiac artery level (thoracic).
3. At renal arteries level (abdominal)
4. Below renal arteries level (abdominal).

In addition, 1–4 section from each of the coronary arteries and renal arteries were taken, 1–4 sections from each of the following arteries in 30 cases were taken, i.e., innominate, common carotid, subclavian, celiac, superior mesenteric, inferior mesenteric and common iliac.

For histological examination tissue processing was done. On the average 7–8 slides were prepared from each block by taking ribbons of tissue. The paraffin section were stained using Haematoxylin and Eosin stain, von Kossa's staining technique, periodic acid Schiff (PAS) reaction, Toludine blue stain and Peral's Prussian blue stain.

The thickness of the fat penniculus between xiphoid and umbilicus was noted on autopsy in all the cases. This thickness was considered as the indicative of the obesity. Three grades were made as <10 mm, <20 mm and <30 mm thickness.

RESULTS

In a total of 130 cases fat penniculus measured <10 mm in 31 cases, <20 mm in 50 cases, and <30 mm in 49 cases. In 4 cases <10 mm, in 10 cases <20 mm and in 16 cases <30mm fat penniculus was measured. The fatty streaks were present in predominantly more cases with fat penniculus <20 mm than in cases with fat penniculus <10 mm and <30 mm. Fibrolipid plaques, complicated and calcified lesions were present in a dominant number of cases with fat penniculus <30 mm on percentage basis. (Table-1), (Figure-1).

Table-1: Distribution of atherosclerotic lesions in aorta and its major branches in relation to fat penniculus between xiphoid and umbilicus

	Fatty streaks						Fibrolipid Plaques						Complicated lesions						Calcified lesions					
	Fat penniculus						Fat penniculus						Fat penniculus						Fat penniculus					
	<10 mm		<20 mm		<30 mm		<10 mm		<20 mm		<30 mm		<10 mm		<20 mm		<30 mm		<10 mm		<20 mm		<30 mm	
Blood vessels	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Thoracic Aorta	20	64.9	45	90.0	15	30.6	4	13.0	16	32.0	21	42.9			8	16.0	13	26.5			3	6.0	7	14.3
Abdominal Aorta	13	42	36	72.0	13	26.5	13	42.0	25	50.0	41	83.7	7	22.6	13	26.0	29	59.2	3	9.7	8	16.0	15	30.6
Anterior descending Lt. CA	4	13.0	10	20.0	5	10.2	13	42.0	22	44.0	34	69.4	3	9.7	5	10.0	10	20.4	1	3.2	1	2.0	3	6.1
Circumflex Lt. C.A	3	9.7	8	16.0	4	8.2	15	48.4	21	42.0	37	75.5	1	3.2	2	4.0	6	12.2	-	-	-	-	1	2.0
Rt. C.A	1	3.2	2	4.0	-	-	-	-	1	2.0	5	10.2	-	-	-	-	1	2.0	-	-	-	-	-	-
Innominate artery	3	75.0	8	80.0	2	12.5	-	-	2	20.0	6	37.5	-	-	1	10.0	4	25.0	-	-	1	10.0	2	12.5
R. C.C Artery	-	-	7	70.0	3	18.8	-	-	2	20.0	7	43.8	-	-	1	10.0	4	25.0	-	-	1	10.0	3	18.8
Lt. CC Artery	-	-	7	70.0	3	18.8	-	-	2	20.0	7	43.8	-	-	1	10.0	5	31.3	-	-	1	10.0	4	25.0
Rt. Subclavian Artery	-	-	7	70.0	4	25.0	-	-	4	40.0	9	56.3	-	-	2	20.0	6	37.5	-	-	1	10.0	7	43.8
Celiac artery	-	-	5	50.0	2	12.9	-	-	1	10.0	5	31.3	-	-	1	10.0	4	25.0	-	-	-	-	3	18.8
Sup. Mesenteric Artery	-	-	5	50.0	3	18.8	-	-	1	10.0	4	25.0	-	-	-	-	4	25.0	-	-	-	-	2	12.5
Inf. Mesenteric Artery	-	-	5	50.0	3	18.0	-	-	1	10.0	5	31.3	-	-	1	10.0	3	38.8	-	-	1	10.0	2	12.5
Rt Renal Artery	10	32.3	20	40.0	11	22.4	1	13.2	8	16.0	23	47.0	-	-	4	8.0	11	22.4	-	-	2	4.0	7	14.3
Lt. renal artery	10	32.3	20	40.0	11	22.4	1	13.2	6	12.0	13	26.5	-	-	3	6.0	8	16.3	-	-	2	4.0	5	10.2
Rt. Common iliac artery	2	50.0	6	60.0	3	18.8	-	-	5	50.0	16	100	-	-	4	40.0	11	68.8	-	-	3	30.0	7	43.8
Lt. common iliac	2	50.0	6	60.0	3	18.8	-	-	5	50.0	16	100	-	-	3	30.0	10	62.5	-	-	2	20.0	7	43.8
Mean incidence in all vessels		**21.3**		**53.2**		**18.1**		**8.2**		**27.5**		**51.6**		**2.3**		**13.3**		**38.5**		**0.7**		**8.6**		**20.6**

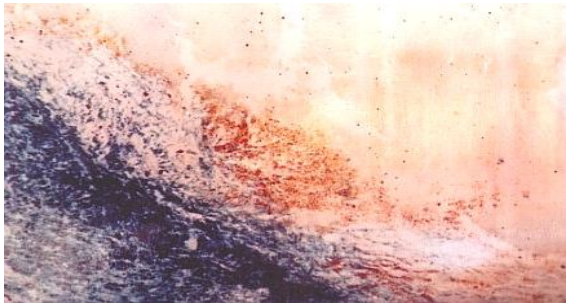

Figure-1: Areas of haemorrhage and massive haemosiderin deposition in a thrombotic coronary artery in a case with fat penniculus between xiphoid and umbilicus <30. Perals Prussian blue stain ×350

DISCUSSION

Fatty streaks in our study cases were present in a dominant number of cases with fat penniculus <20 mm than in cases with fat penniculus <10 mm and <30 mm thickness. The fibrolipid plaques, complicated and calcified lesions were seen in a dominant number of cases with fat penniculus <30 mm than in cases with fat penniculus <10 mm and <20 mm thickness. It has been found by epidemiological study that body weight possibly influence both coronary and aortic atherosclerosis.[1] Nestel[3] estimated that individuals with optimal weight would have 25% less coronary heart disease than in those who are overweight. It has also been observed, that weight loss significantly increases high-density lipoprotein-cholesterol concentration.[4] Obesity might tend to cause ischemic heart disease by increasing the haemodynamic load on the circulatory system. There is an increased blood volume and resting cardiac output, elevated left ventricular filling pressure at rest or during exercise, diminished left ventricular chamber efficiency and increased vascular resistance. Weight reduction normalises these haemodynamic disturbances.[5] It was indicated that there is a significant correlation between body weight and blood pressure.[6] They explained that in obesity there is hyperinsulinemia that promotes retention of sodium by the kidney and also increase the sympathetic nervous system tone by affecting an insulin-sensitive area in the ventro-medial nucleus of the hypothalamus.[7] In addition to that there is

increased turnover of nor-adranaline in over feeding that can increase renal tubular reabsorption of sodium. Moreover, overnutrition increases the activity of thyroid hormones that may enhance sympathetic activity. Obesity has been clearly established as an independent risk factor for the development of coronary artery disease and acute coronary syndrome.[8,9] There is also evidence that an increase body mass index (BMI) is associated with increased overall mortality.[8,10] It has been established that there is relation between body mass index and outcomes in patients with acute myocardial infarction.[11] Obesity is associated with AMI at younger age.[12]

CONCLUSION

All the raised lesions were seen more frequently in cases with Fat Penniculus 20 mm to < 30 mm than in cases with Fat Penniculus <10 mm and <20 mm thickness.

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Address for Correspondence:
Dr. Amjad Naeem, 254-A- Block, GOR-5, Faisal Town, Lahore, Pakistan. **Cell:** +92-332-4558924
Email: dramjadnaeem@yahoo.com