Original Article

Atherosclerotic Lesions in Hypertensive Subjects - A Human Autosy Study

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ABSTRACT

Objective: To assess the incidence and severity of atherosclerotic lesions in hypertensive subjects in our population.
Study design: Prospective descriptive observational study.
Place and duration of study: Mortuary of Forensic Department, King Edward Medical University Lahore and Pathology Department of Allama Iqbal Medical College Lahore. This study was completed in one and a half year.
Subjects and Methods: A total of 130 human autopsies were carried out in the mortuary of King Edward Medical University Lahore. Heart, aorta and its major branches were collected. History was taken from the close relative of deceased for hypertension. One to four areas of tissue were taken for each artery and aorta for histological examination. The section were stained with Haemotoxylin and Eosin stain. Different special stains were also performed on all cases to differentiate different components of atherosclerotic lesions.
Results: The fibrolipid plaques, complicated lesions and calcified lesions were present in a predominant number of cases in aorta and its major branches, except the fibrolipid plaques were less dominant in the right coronary artery, the complicated lesions were seen less frequently in the right coronary artery and the left renal artery and the calcified lesions were observed less dominantly in the thoracic aorta, anterior descending branch and circumflex branch of left coronary, innominate artery, coelic artery, superior mesenteric artery, inferior mesenteric artery and renal arteries. The calcified lesions were absent in the right coronary artery.
Conclusion: This study although preliminary but basic and observational in nature indicates the considerable severity of raised atherosclerotic lesions in hypertensive subjects in our population

Key wards: Atherosclerosis, lesions, hypertensive, arteries

INTRODUCTION

Hypertension is an important accelerator of the atherosclerotic process and it frequently accompanies adult coronary heart disease (1). The risk of coronary heart disease is strongly related to the levels of blood pressure. This is true for both males and females of all ages (2) (3,4) observed a remarkably significant difference between the severity of lesions of atherosclerosis in hypertensive and non-hypertensive. The South Asian countries contribute the highest proportion of the burden of cardiovascular disease compared with any other region globally(5).

MATERIALS AND METHODS:

A total of one hundred and thirty (130) human autopsies were carried out, in which ninety (90) were males and forty (40) were females in the study. The age range was between 8 and 85 years. The autopsies were done in the Mortuary of Forensic Department, King Edward Medical University, Lahore.

Selection of Dead Bodies.

All the 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 i.e 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.

Performa for relevant history and autopsy findings.

1. Name
2. Date of birth (Exact/Application)
3. Date of death
4. Sex
5. Place of Residence
6. Occupation.
7. Any Medical Care before death.
8. Mode of death, Accidental death, non-accidental death
9. Was any diagnosis made before death, if yes, clinical diagnosis.
10. History of hypertension.

Heart, aorta and its major branches were collected.

Grading of Atheroma

Gross sections of coronary arteries were graded by one of the four scores according to the degree of atheromatous narrowing, Grade-I, upto 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 the 130 autopsies aorta, coronary arteries and renal arteries were examined. In thirty cases besides these three types of arteries the other major branches of aorta were also included in this study. 1-4 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 thirty cases were taken i.e. innominate, common carotid, subclavian, coeliac,, 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.

RESULT

In a total of 130 cases in whom aorta, coronary arteries and renal arteries were collected, 11 showed the history of hypertension. Amongst 30 cases in whom other arteries were also collected 3 cases showed the history of hypertension. The fatty streaks were not present in a predominant number of cases in aorta and its major branches in hypertensive. The fibrolipid plaques, complicated lesions and calcified lesions were present in a predominant number of cases in aorta and its major branches, except the fibrolipid plaques were less dominant in the right coronary artery, the complicated lesions were seen less frequently in the right coronary artery and the left renal artery and the calcified lesions were observed less dominantly in the thoracic aorta, anterior descending branch and circumflex branch of left coronary, innominate artery, coeliac artery, superior mesenteric artery, inferior mesenteric artery and renal arteries. The calcified lesions were absent in the right coronary artery. (Table No.1).

Table No.1: Number and percentage Distribution of atherosclerotic lesions in aorta and its major branches in relation to the H/O Hypertension

Blood Vessels	Fatty Streaks		Fibrolipid Plaques		Complicated lesions		Calcified Lesions	
	No	%	No	%	No	%	No	%
Thoracic aorta	3	27.3	7	63.6	6	45.5	3	27.3
Abdominal aorta	3	27.3	11	100.0	10	91.0	10	91.0
Anterior descending Lt. coronary artery	1	9.1	11	100.0	7	63.6	3	18.2
Circumflex Lt. coronary artery	1	18.2	11	100.0	5	45.5	1	9.1
Rt. coronary artery	1	9.1	3	27.3	1	9.1	-	-
Innominate artery	1	33.3	2	66.7	2	66.7	1	33.3
Rt. Common carotid artery	-	-	3	100.0	3	100.0	2	66.7
Lt. Common carotid artery	-	-	3	100.0	3	100.0	2	66.7
Rt. Subclavian Artery	1	33.3	3	100.0	3	100.0	2	66.7
Lt. Subclavian Artery	1	33.3	3	100.0	3	100.0	2	66.7
Coeliac Artery	1	33.3	2	66.7	2	66.7	1	33.3
Sup. Mesenteric Artery	1	33.3	2	66.7	2	66.7	1	33.3
Inf. Mesenteric Artery	1	33.3	2	66.7	2	66.7	1	33.3
Rt. Renal Artery	3	27.3	6	54.5	5	45.5	3	27.3
Lt. Renal Artery	3	27.3	6	54.5	3	27.3	2	18.2
Rt. Common iliac Artery	1	33.3	3	100.0	3	100.0	3	100.0
Lt. common iliac Artery	1	33.3	3	100.0	3	100.0	3	100.0
Mean incidence in all vessels		**24.4%**		**80.2%**		**70.3%**		**46.5%**

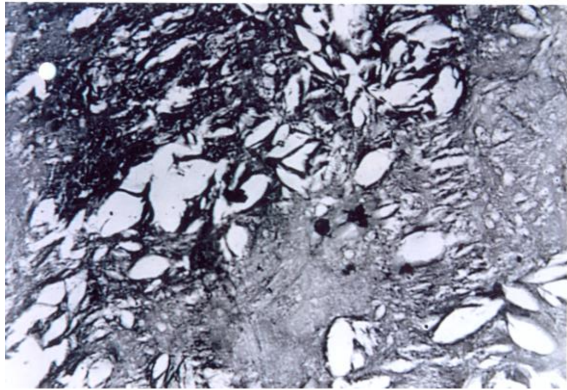

Fig. # 1 Photomicrograph of Atherosclerotic lesions in aorta in hypertensive subject showing cholesterol crystal clefts and free lipid pool. Haematoxylin and Eosin stain X 200mgf.

DISCUSSION

In this study the fatty streaks were not considerably seen in aorta and its major branches in hypertensive, whereas the fibrolipid plaques, complicated and calcified lesions were present in a predominant number of cases. However, the fibrolipid plaques were less dominant in the right coronary artery, the complicated lesions were seen less frequently in the right coronary and left renal artery and the calcified lesions were observed less dominantly in the thoracic aorta, anterior descending and circumflex branch of left coronary, innominate artery, coeliac artery, superior mesenteric artery, inferior mesenteric artery and renal arteries. The calcified lesions were absent in the right coronary artery. In an epidemiological study also found that there is acceleration of the development of all types of atherosclerotic lesions except fatty streaks in hypertensive (6). Hypertension was strongly related to the coronary heart disease (7) and an independent association has been found between aortic and coronary atherosclerosis and this disease (8) (9,10)established that in hypertension the excess shearing stress causes deformation of endothelial cells and ultimately erosion of the sub-endothelial tissue that enhances platelet adhesion and aggregation leading to atherosclerotic process. (11, 12) indicated that many anti-hypertensive drugs are positively correlated with blood lipid levels particularly low-density lipoprotein- cholesterol and very low-density lipoprotein cholesterol. These drugs may also reduce the average work load of the heart, but they may not protect against occasional bursts of pressure. It is just such pressure variability and raised lipid levels that may increase the risk of coronary heart disease. The earlier age of AMI in South Asians can be largely explained by higher risk factor levels at younger age(13)

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