ORIGINAL ARTICLE

Frequency of Aortic Valve Calcification Detected on Computed Tomography

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ABSTRACT

Aim: To determine the frequency of aortic valve calcification detected on computed tomography.

Place and duration of study: Punjab Institute of Cardiology Lahore from 1ST August 2019 to 31st November 2020

Methods: A descriptive study was conducted at Punjab Institute of Cardiology, Lahore. Data of 61 participants were selected through convenient sampling technique. SPSS version 21.0 was used for data analysis.

Results: Analysis of data showed that study comprising 50 males (82%) and 11 females (18%). Out 61 patients, 9 patients (14.8%) had mild aortic calcification, 19 patients (31.1%) had moderate aortic and 25 patients (41%) had sever aortic calcification.Total number of 61 patients, in which 38 (07 females and 31 males) patients (62.3%) had diabetes mellitus and 10 (02 females and 08 males) patients (16.4%) had hypertension. Total number of 61 patients in which, 50 (82%) patients had no plaque in coronary artery vessels, 07 patients (11.5%) had plaque in single vessels, 01 patient (1.6%) had plaque in two vessels and 03 patients (4.9%) had plaque in three vessels of their coronary arteries.

Conclusions: Frequency of aortic calcification was concluded in coronary arteries by multislice computed tomography . It concluded from our study that out of total patients referred for screening purpose out 61 patients 9 patients (14.8%) had mild aortic calcification, 19 patients (31.1%) had moderate aortic and 25 patients (41.0%) had sever aortic calcification. Findings of our study revealed that patients with HTN and diabetes were also more often males and the frequency of people with diabetes was greater than hypertensive people. In our population males were at more risk than females to develop aortic calcification in future.

Keywords: Aortic valves calcification, Computed Tomography.

INTRODUCTION

Aortic Valve Calcification (AVC) is a situation wherein aortic valve has calcium depositions in heart. Depositions of calcium can become a cause of narrowing of aortic valve. Mainly often fault is of degenerative etiology (82%) concerning steady fibrotic thickness of valve, pursued through calcifications which look like osteogenesis[1]. It was thought that AVC is reactive method happening while usual consequence of aging. Though, consequences of latest studies verified so as multifarious mechanism, including lipoprotein deposition, persistent swelling as well as calcifications cascade[2]. Particularly, calcium aortic stenosis is accountable for significant mortality along with morbidity[3].

Depositions of calcium can become a cause of narrowing of aortic valvemay turn into rigorous sufficient to diminish flow of blood by valve, this situation termed as aortic valve stenosis.[4] Aortic stenosis is mainly ordinary cardiac disease in industrial countries moreover modest to cruel in 4.3 to 4.8% individual of 75 years or above. More than precedent 60 years, prime reason of aortic stenosis altered from stiff to senile calcification as well as deterioration. It was previously consideration to easy wear and tear in advancing age consequence except more and more implicated chosen extremely regular procedure by some resemblances to atherosclerosis.[5]Progressive calcification cycle in valve leaflet after that happening foremost to unalterable demonstration toward rigorous aortic stenosis furthermore progression of indications as well as heart malfunction except aortic valve substitute is executed. Aortic stenosis is ordinary as well as critical situation in which progression fibro-calcific alteration in valve leaflet causes out-flow region impediment. Inappropriate performance aortic valve leaflet can too blood for leaking reverse in to left-ventricle following entering in aorta is termed as deficiency[6].

CT has turn into implement usually used to evaluate level of AVC. Various studies upon pervasiveness of AVC have been performing by this technique.[7] Whereas multislice computed tomography has been recognized to assess coronary arteries for decade, cardiac valves were disused primarily. Single cause was actuality to echocardiography is sturdy modality in clinical performance.[8] At a halt, it have limitation, for example being connected to spectator unpredictability as well as elevated person dissimilarity in figure excellence awaiting upon body habitus or run dependence. Consequently, multi modality imaging involving computed tomography is necessary for analytic develop of valvular sickness.[9]Aim of this study is to determine the frequency and grades of stenosis that cause calcification detected on computed tomography. The significance of this study is multi-slice computed tomography gives precise anatomical imagery of aorta root as well as valvular orifice. This method gives benefit of quantify calcium load at valve level. This study suggested a cut-off point in order to distinguish severe from moderate aortic stenosis.

MATERIAL AND METHODS

This descriptive case series was carried out at Punjab Institute of Cardiology Lahore from 1ST August 2019 to 31st November 2020 and 61 patients were included. 64 slices

Toshiba, Aquiline ONE, 320 detector arrays, 3rd generation. Patient selected for study some showed aortic valve calcification on CT, which was performed without IV contrast material. On the basis of inclusion and exclusion criteria patient above 18 years (males and females) were included.All patients with Aortic valve stenosis and suspicion of Aortic valve calcification presenting to hospital were included.Pregnant women and patients who had contraindication to CT scan i.e., CT incompatible prosthesis or cardiac pacemaker holders determined on history and medical record and Patients not willing to participate in the study were included.Data was entered and analyzed using SPSS 21.0. Mean and standard deviation was calculated for quantitative variables i.e. age. Frequency and percentage was calculated for qualitative variables i.e. gender and presence of the calcification on CT scans. 2×2 frequency table was used to calculate sensitivity, specificity, positive predictive value, negative predictive value and frequency of aortic valve calcification was reported.

RESULTS

Analysis of data showed that study comprising 50 males (82%) and 11 females (18%). Out 61 patients, 9 patients (14.8%) had mild aortic calcification, 19 patients (31.1%) had moderate aortic and 25 patients (41%) had sever aortic calcification. Total number of 61 patients, in which 38(07 females and 31 males) patients (62.3%) had diabetes mellitus and 10(02 females and 08 males) patients (16.4%) had hypertension. Total number of 61 patients in which, 50(82%) patients had no plaque in coronary artery vessels, 07 patients (11.5%) had plaque in single vessels, 01 patient (1.6%) had plaque in two vessels and 03 patients (4.9%) had plaque in three vessels of their coronary arteries.

Table 1: Total numbers of 61 patients were included in this research comprising 50 males (82%) and 11 females (18%).

Gender		
	Frequency	**Percent**
Females	11	18.0
Males	50	82.0
Total	61	100.0

Table 2: Total number of 61 patients in which, 50 patients had no plaque in coronary artery vessels, 7 patients had plaque in single vessels, 1 patients had plaque in two vessels and 3 patients had plaque in three vessels of their coronary arteries.

Coronary Artery Vessels Involved		
	Frequency	**Percent**
No Vessels	50	82.0
One vessel	7	11.5
Two Vessels	1	1.6
Three Vessels	3	4.9
Total	61	100.0

Table 3: Result of frequency distribution of diabetes Mellitus. Total number of 61 patients, in which 38 patients (62.3 %) had diabetes mellitus, 23 patients (37.7 %) had no diabetes mellitus.

Diabetes Mellitus		
	Frequency	**Percent**
Non Diabetic	23	37.7
Diabetic	38	62.3
Total	61	100.0

Table 4: Result of frequency distribution of diabetes Mellitus. Total number of 61 patients, in which 10 patients (16.4%) had hypertension, 51 patients (83.6%) had no hypertension.

Hypertension		
	Frequency	**Percent**
No	51	83.6
Yes	10	16.4
Total	61	100.0

Table 5: Total number of 61 patients in which 8 patients had no aortic calcification, 09 patients had mild aortic calcification, 19 patients had moderate aortic, 25 patients had sever aortic calcification.

Aortic Calcification		
	Frequency	**Percent**
Mild	9	14.8
Moderate	19	31.1
Normal	8	13.1
Severe	25	41.0

Table 6: Frequency distribution of aortic calcification. Total number of 61 patients, in which 53 patients (86.9%) had aortic calcification, 8 patients (13.1%) were normal.

Aortic Calcification		
	Frequency	**Percent**
Normal	8	13.1
Yes	53	86.9
Total	61	100.0

Table 7: In this table total patients are 61, in which 11 females and 50 were males, In Females 1 had normal, 1 mild, 4 moderate and 5 were sever aortic calcification. In males, 7 h normal, 8 mild, 15 moderate and 20 had sever aortic calcification.

Cross Tabulation between Gender and Aortic Calcification							
			Aortic Calcification				Total
			Mild	**Moderate**	**Sever**	**Normal**	
Gender	Female	Count	1	4	5	1	11
		% within Gender	9.1%	36.4%	45.5%	9.1%	100.0%
	Male	Count	8	15	20	7	50
		% within Gender	16.0%	30.0%	40.0%	14%	100.0%
Total		Count	9	19	25	8	61
		% within Gender	14.8%	31.1%	41.0%	13.1%	100.0%

Table 8: In Cross tabulation 4 females had no diabetes and 7 had diabetes mellitus, in males 19 had no diabetes mellitus and 31 had diabetes mellitus.

Cross Tabulation between Gender and DM				
Gender		Diabetes Mellitus		Total
		No	Yes	
Female	Count	4	7	11
	% within Gender	36.4%	63.6%	100%
Male	Count	19	31	50
	% within Gender	38.0%	62.0%	100%
Total	Count	23	38	61
	% within Gender	37.7%	62.3%	100%

Table 9: In Cross tabulation 9 females had no hypertension and 2 had hypertension, in males 42 had no hypertension and 8 had hypertension

Cross Tabulation between Gender and Hypertension				
Gender		Hypertension		Total
		No	Yes	
Female	Count	9	2	11
	% within Gender	81.8%	18.2%	100%
Male	Count	42	8	50
	% within Gender	84.0%	16.0%	100%
Total	Count	51	10	61
	% within Gender	83.6%	16.4%	100%

DISCUSSION

This study was design to determine the frequency of AVC identified on Computed Tomography. On the basis of diagnosis for identification of aortic valve calcification in which calcium deposits on the aortic valve in the heart, Computed tomography has become a tool commonly used for evaluating the degree of calcification of the valve or vessels. In current study, the attempt was made to determine the frequency of aortic valve calcification. Data were collected according to age, gender, diabetes mellitus, hypertension, aortic valve stenosis and suspicion of aortic valve calcification. Data of 61 patients (18% females and 82% males) were collected from Punjab institute of cardiology Hospital Lahore. According to Konstantinos Dean Boudoulas et al., 2017 traditionally, calcification of the tricuspid aortic valve resulting in aortic stenosis was thought to be secondary to a wear-and-tear effect on the valve due to the aging process.[10] Dr. Pomerance introduced almost 5 decades ago the possible role of inflammation in valve calcification. In her pioneering work, she described inflammatory changes in areas adjacent to calcification in the mitral annulus.[11] In this study, the incidence of mitral annular calcifications in patients older than 50 years was 8.5%. Importantly, the incidence of aortic valve calcification in male and female patients with mitral annular calcification was 36% and 30%, respectively.[12] Their study supports the our results of aortic calcification, out 61 patients 14.8% patients (1 female and 8 males) had mild aortic calcification, 31.1% patients (4 females and 15 males) had moderate aortic and 41% patients (5 females and 20 males) had sever aortic calcification[13].

According to the results of current study, out of 61 patients, 16.4% had hypertension, 62.3% patients were diabetic. The study was conducted by Nathan D. Wong et al**[13]** they compared the extent and prevalence of metabolic syndrome, diabetes or neither condition. They also had a large sample size as compared to us. They reported that 67% of patients with diabetes had coronary calcification while in our study, total of 61 patients in which 62.3% patients (7 females and 31 males) were diabetic[15]. Nobuo Tomizawa et al conducted a study in 2015 to determine the difference of coronary artery disease (CAD) severity and a characteristics of plaque between patients with either one of hypertension, diabetes or dyslipidemia[16]. Their sample size was large compared to ours. Out of the 1,161 patients, 38% patients had hypertension, their study supports our results in which16.4% patients (2 females and 08 males) were hypertensive[17]. Findings of their study support our results that patients with HTN and diabetes were also more often males and the frequency of people with diabetes was greater than hypertensive people.[18] It is concluded that male's patients are more affected than females and frequency of diabetes is greater than any other risk factor. From our study it is also concluded that frequency of severe aortic calcification is greater.

CONCLUSION

Frequency of aortic calcification is concluded in coronary arteries by multislice computed tomography. It is concluded from our study that out of total patients referred for screening purpose out 61 patients 9 patients (14.8%) had mild aortic calcification, 19 patients (31.1%) had moderate aortic and 25 patients (41.0%) had sever aortic calcification. Findings of our study revealed that patients with HTN and diabetes were also more often males and the frequency of people with diabetes was greater than hypertensive people. In our population males are at more risk than females to found aortic calcification.

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