

NAVIGATING THE CORONARY ARTERIES CORRIDORS: RADIOLOGICAL PERSPECTIVE OF CORONARY ARTERY CALCIFICATION OVER THE YEARS IN PAKISTANI POPULATION

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ABSTRACT

AIM/OBJECTIVE: To assess the pattern of coronary artery disease in Pakistani population according to year, gender, artery and dominance. **BACKGROUND:** Coronary artery calcium scoring is being used frequently nowadays as a reliable tool in categorisation and prognosis of cardiovascular risk. Calcium scoring is an authentic predictor for diagnosing coronary artery disease having 99% negative predictor value, 91% sensitive and 64% specific. **MATERIALS AND METHODS:** Total of 3146 patients of last 6 years were selected from the radiology database retrospectively from 2017 to 2023. Coronary angiography vessel based were analysed on Vitrea by consultants, using Toshiba 640 and Siemens 128 slice. Agatston CAC scoring was used in calculating the calcium. Patient s demographics and data were obtained from our hospital record system. **RESULT:** Out of 3146 patients, 828 females and 1927 males with most common age group from 40-60 years, 1494 were diseased and artery most commonly involved was found to be LAD in about 687 patients, 509 males and 178 females followed by RCA and then LCX. Most of the patients were right dominant (1622 males & 706 females) followed by left dominance (217 males & 86 females) and least were codominant (88 males & 36 females). **CONCLUSION:** Calcium scoring should be assessed in all of the patients whether symptomatic or asymptomatic to evaluate cardiovascular risk irrespective of age, year and gender.

Key Words: Coronary Artery Disease, CT Coronary Angiography, Coronary Calcium Scoring.

Introduction

Coronary artery disease (CAD) ranks as the predominant cardiovascular pathology accounting for the foremost cause of mortality. Most of its risk factors are modifiable and shared among both genders.¹ The prevalence of coronary artery calcification (CAC) exhibits a notable age and gender dependency, manifesting in more than 90% of males and approximately 67% of females aged 70 years and above.² The coronary arteries are the vital conduits responsible for supplying oxygenated blood to the myocardium,

ensuring the continuous and efficient functioning of the heart. However, the intricate coronary artery system is not impervious to change. Over time, a complex interplay of genetic predisposition, lifestyle factors, and metabolic processes can lead to the deposition of calcium within the arterial walls, a phenomenon known as coronary artery calcification (CAC). This calcification process represents a dynamic and multifaceted aspect of cardiovascular health, which has garnered significant attention within the

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realm of cardiology and radiology.³ Coronary computed tomography (CT) angiography provides a non-invasive means to visualize the coronary arteries, presenting an efficacious method for screening with sensitivity between 83-99% and specificity ranging from 93-98%.⁴

Material and Methods

After approval from research committee this retrospective study was conducted. From 2017 to 2023, 3146 patients were chosen from the radiology database. Consultants used Toshiba 640 and Siemens 128 slice to analyze vessel-based coronary angiography on Vitrea. The calcium was calculated using Agatston CAC scoring (Fig.1 & 2). Our hospital record system RIS was used to acquire patient details and data.

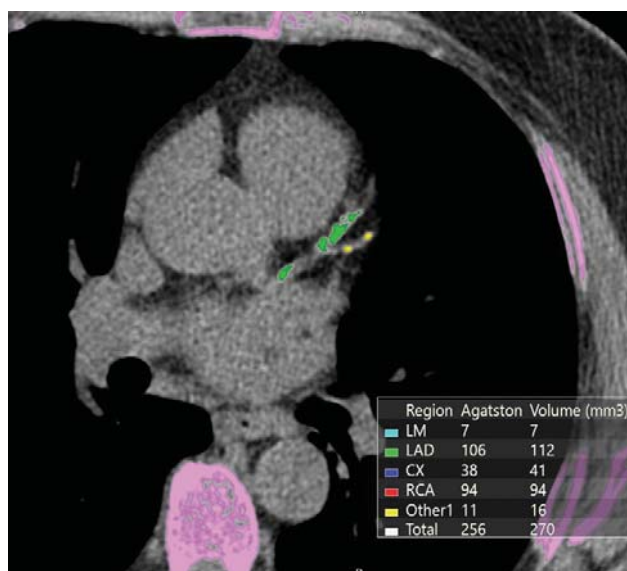


Figure 1: Calcium scoring

Statistics: Stats done using spss version 25 and test used was t-test.

Inclusion Criteria: Patients with atherosclerotic coronary calcifications were included in the study.

Exclusion Criteria: Patients post CABG or without any calcification were not included.

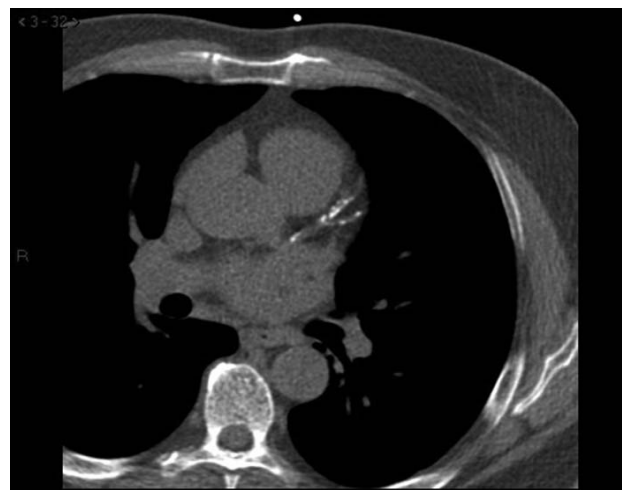


Figure 2: Coronary calcification in LAD.

Results

Out of 3146 patients, 828 females and 1927 men with the most prevalent age range of 40-60 years, 1494 were diseased, with the LAD being the most usually affected artery in about 687 patients, 509 males and 178 females, followed by the RCA and finally the LCX. The majority of the patients (1622 men and 706 females) were right dominant, followed by left dominance (217 males and 86 females), and the fewest were codominant (88 males and 36 females). (Fig.3a-e)

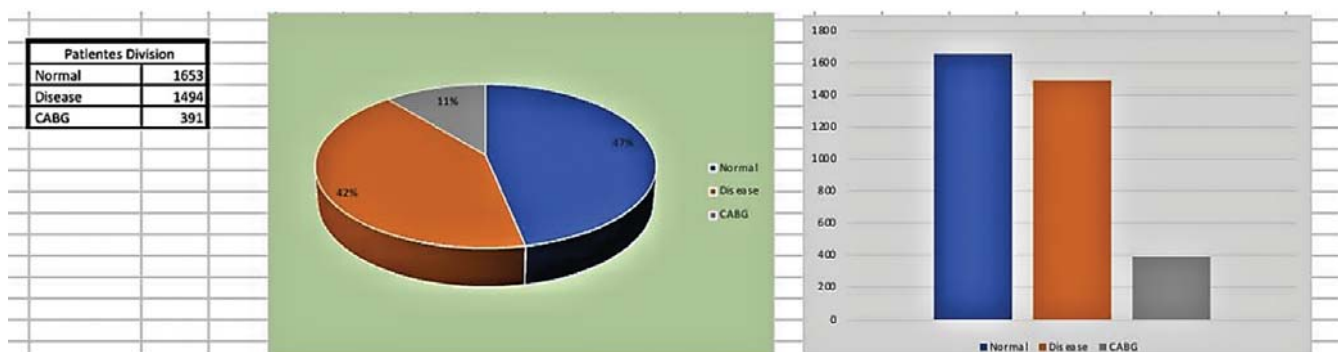


Figure 3a: Patient's classes

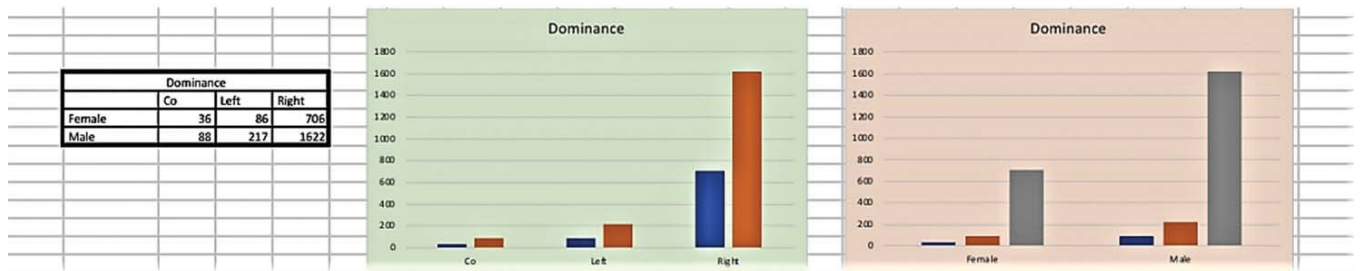


Figure 3b: Gender wise dominant coronary supply

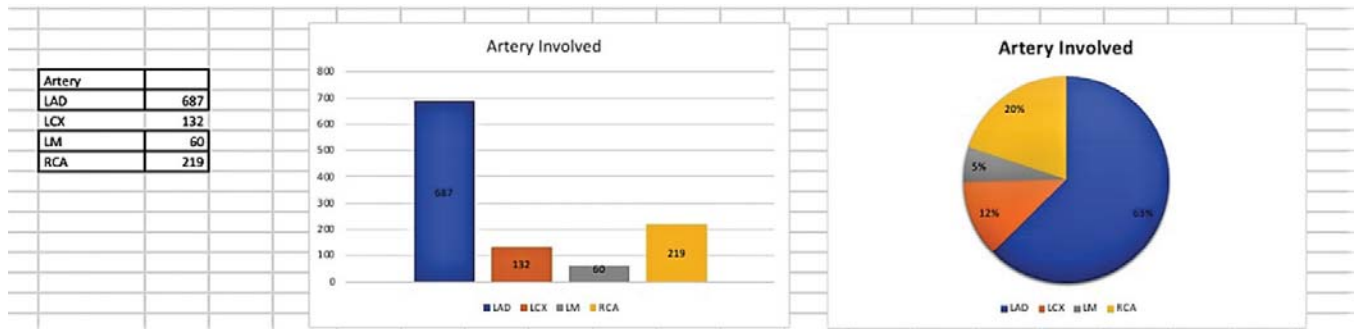


Figure 3c: Vessels wise distribution of CAD on CTA

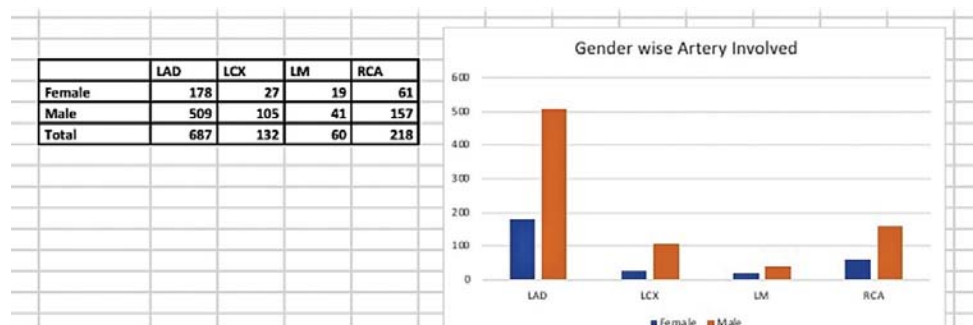


Figure 3d: Gender wise distribution of diseased vessels

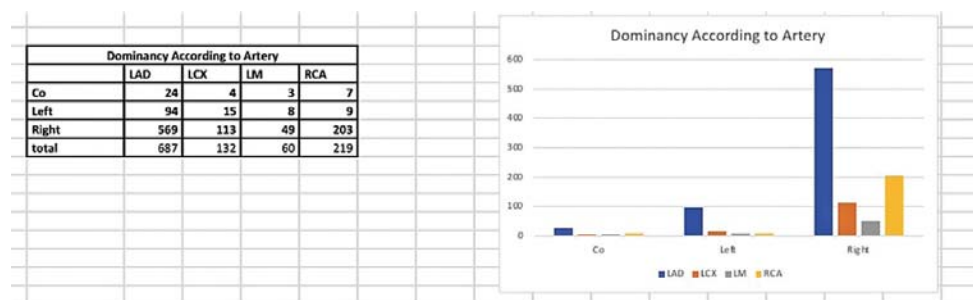


Figure 3e: Overall dominant coronary artery

Discussion

Atherosclerotic cardiovascular diseases (ASCVD) affect almost one-fourth of the world's population, who live in South Asia.^{5,6} The world's efforts to reduce

the burden of ASCVD are paying off with a decrease in the worldwide disease burden; yet, it is increasing in the South Asian area.⁷ The measurement of coronary artery calcium on ECGgated or triggered cardiac CT is a potent cardiovascular risk assessment

approach that employs a wellvalidated score (usually Agatston units). The presence and quantity of calcium are both linked to an increased risk of cardiovascular events.⁸ We feel that coronary calcium should be regularly reported since it gives an opportunity for risk factor management prior to clinically obvious cardiovascular disease as an accidental discovery. Previous research has demonstrated that the presence of any coronary calcification increases the risk of cardiovascular disease over the absence of any calcification.⁹ One of the major advantages of CAC is its high negative predictive value for clinically significant coronary atherosclerosis, which refines the threshold for initiating life-long preventive therapy in middle-aged and older individuals who had relatively increased risk estimates from conventional risk scores but were found to be very low risk by using CAC.¹⁰ It has also been beneficial in detecting unnoticed cardiac illness in younger persons, in whom any CAC discovered incidentally is clinically important and warrants preventative medication.¹¹ Furthermore, its utility as a tool for physician-patient shared decision making is crucial, as research has shown that patients who understand their CAC score are more likely to adhere to their prescriptions and make lifestyle changes.¹²

Conclusion

CAC has been thoroughly demonstrated to be beneficial in predicting CVD risk, as well as various non-CVD diseases and all-cause mortality. CAC is also the foundation for new concepts like coronary and cardiovascular age, which aim to improve risk communication between health care professionals and patients.


Conflict of Interest: None

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