DOI: https://doi.org/10.54393/pbmj.v5i2.302

PAKISTAN BIOMEDICAL JOURNAL

https://www.pakistanbmj.com/journal/index.php/pbmj/index

Volume 5, Issue 2 (February 2022)

Orignal Article

Analysis and Outcome of Single Coronary Artery Detected on Coronary Computed Tomography Angiography

Ammar Abdul Rahman,[1*] Amna Zainab, [2]Ayesha Siddiqa and Muhammad Zarrar Arif Butt [3]

[1]Rai Medical College, Sargodha, Pakistan
[2]Sheikh Zayed Hospital, Lahore, Pakistan
[3]Fatima Jinnah Medical University, Lahore, Pakistan
[4]Fatima Memorial Hospital, Lahore, Pakistan

ARTIC LE IN FO

Key Words:
CCTA, Artery, Patients, Significance

How to Cite:
Rahman, A. A. ., Zainab, A. ., Siddiqa, A. ., & Arif Butt, M. Z. . (2022). Analysis and outcome of single coronary artery detected on CCTA: Coronary Artery Detected on coronary computed tomography angiography. Pakistan BioMedical Journal, 5(2). https://doi.org/10.54393/pbmj.v5i2.302

***Corresponding Author:**
Ammar Abdul RahmanRai Medical College, Sargodha, Pakistan
ammar425@gmail.com

ABSTRACT

A congenital abnormality known as a single coronary artery (SCA) is usually discovered by coincidence. SCA is thought to affect as little as 0.024% to 0.066% of people who have routine coronary artery catheterization. **Objective:** TSingle coronary arteries found on coronary angiography are the major focus of this investigation on coronary computed tomography angiography (CCTA). **Methods:** The Rai Medical College in Bangalore conducted a cross-sectional study between April 2021 and November 2021. Pre-cardiac surgery assessment, evaluation of a coronary stent or graft, evaluation of cardiomyopathy or congenital heart disease, and evaluation of syncope were the most prevalent reasons for CCTA. These were followed by chest discomfort to rule out coronary artery disease. **Results:** Signifcant differences were seen in SBP, DBP, PP, and BMI between the control and SCA groups (P0.05). Neither group differed substantially from the other in terms of age, FBG, TG, TC, HDL-C, or LDL-C (P0.05). **Conclusion:** According to the course an abnormal artery takes, SCA can be divided into several unique subgroups for better understanding.

INTRODUCTION

A congenital abnormality known as a single coronary artery (SCA) is usually discovered by coincidence. SCA is thought to affect as little as 0.024 percent to 0.066 percent of people who have routine coronary artery catheterization. One of the most fatal and disabling illnesses in the world, coronary artery disease, is prevalent in Singapore (CAD). Although coronary angiography (CCA) has been widely used to diagnose CAD, its accuracy and capacity to identify the number, location, and severity of coronary obstructive lesions in the heart make it the gold standard [1]. If you're born with a congenital abnormality called a single coronary artery (SCA), you're not alone. SCA occurs in as little as 0.024 percent to 0.066 percent of normal coronary artery catheterizations. Singapore has one of the world's highest rates of coronary heart disease (CAD). Heart disease can only be accurately diagnosed by CCA (CAD). As a result, it can precisely identify coronary obstructive lesions in the heart's arteries [2]. One or more congenital anomalies, such as a bicuspid aortic valve or an isolated anomaly, can cause SCA. It can also occur alone. Anatomical or morphological changes that occur in a population at a frequency greater than one percent of the general population are considered deviations from the norm. The USDA estimates that less than one percent of the world's population has these particular cultivars, making them among the rarest. It is considered an oddity when just a small percentage of the population is affected. These arteries lead to the right atrioventricular groove. Atrioventricular groove, left coronary artery The left coronary artery is the origin of 38% of the sinoatrial node branches, which are found in half of the coronary arteries.

DOI: https://doi.org/10.54393/pbmj.v5i2.302

There are two basic forms of SCA, according to Lipton and colleagues: right and left. Anatomical pathways further differentiated subtypes I, II and III [5]. A single aortic orifice can supply full coronary blood fow to the whole myocardium. [6] SCAs from both Valsalva sinuses are similarly distributed. Remember that kinking or pinching of the aberrant SCA branches between the two major artery systems might produce myocardial ischemia during physical activity. The CAG should be used as soon as an SCA is detected. Anomalous coronary arteries can be detected non-invasively utilizing multi-slice CT and cardiac magnetic resonance imaging (CMR) [7]. The primary goal of this research is to investigate the prevalence of coronary artery disease and the outcomes associated with a single coronary artery found during CCTA.

METHODS

and November 2021. Pre-cardiac surgery assessment, evaluation of a coronary stent or graft, evaluation of cardiomyopathy or congenital heart disease, and evaluation of syncope were the most prevalent reasons for CCTA. These were followed by chest discomfort to rule out coronary artery disease. A total of 100 patients were surveyed for this study. Electrocardiograms (ECGs), heart rates, and blood pressures of all patients were collected before the scan. Patients having a baseline heart rate of more than 70 beats per minute were given this treatment as part of the operation preparation to reduce their heart rate. The procedure began with a non-enhanced CT scan performed at 75% of the resting respiratory rate interval, which was then followed by an ECG-gated CT scan. At 6 millilitres per second, a CCTA scan was performed using an initial contrast solution that ranged from 60 to 75 millilitre, followed by 30 millilitres of water. With a slice thickness of 0.6 mm and a gated ECG scan, a contrast-enhanced scan was conducted while holding one's breath inhaling during inhalation. Auto or manual adjustments were made to the scan settings to ensure the best possible image quality while minimizing radiation exposure. SPSS version 19 was used to gather and analyze the data. To display the data, the average and standard deviation were employed. The comparison between groups was initially analyzed using the normality and homogeneity tests for variance. Passing the test would be judged using the t-test. P-values under 0.05 were deemed significantfor statistical differences.

RESULTS

SBP, DBP, PP, and BMI were all greater in the SCA group than in the control group, a findingthat was statistically significant(P0.05). There were no significandifferences in age, FBG, TG, TC, HDL-C, or LDL-C between the two groups (P0.05)(Table 1).

	SCA Group	Control Group (n=50)	t Value	p-Value
Age	55.56±7.46	52.64±8.28	2.726	0.091
BMI [kg/m2]	23.31±3.267	24.37±2.08	3.294	0.022
SBP [mmHg]	130.35±15.90	126.53±23.46	7.348	0.000
FBG	5.32±0.65	5.07±0.48	1.664	0.081
TG	1.64±0.75	1.68±0.85	1.849	0.061
TC	3.95±0.56	5.78±0.83	1.612	0.080
HDL	1.30±0.43	1.31±0.56	1.717	0.089
LDL	3.46±0.58	3.38±0.66	1.139	0.266

Table 1: SCA Group and Control Group in General Materials

CC was lower in the SCA group than in the control group despite greater IMT, and PWV in the bilateral carotid arteries. The statistical significance of these differences was established(p0.05)

Group	IMT(μm)	CC (mm2/ Kpa)	α	β	PWV (m/s)
SCAGroup	694.88±77.63	0.89±0.13	5.68±1.23	11.25±1.01	9.49±1.09
Control Group	586.87±62.12	0.96±0.08	4.77±0.62	9.24±1.24	7.22±1.11
T [value]	7.918	-3.2150	4.612	9.003	10.482
P value	0.000	.003	0.000	0.000	0.000
Note : IMT : intima-media thickness ; CC : compliance coefficient ; α : stiffness indicator ; β : stiffness parameter PWV : pulse wave velocity					

Table 2: Comparison between SCA Group and Control Group in structural and functional parameters of the left arteria carotis communis (x±s)

Group	IMT(μm)	CC (mm2/ Kpa)	α	β	PWV (m/s)
SCAGroup	637.42±93.30	0.91±0.09	5.46±1.19	11.14±1.02	9.29±1.05
Control Group	545.13±62.28	0.99±0.08	4.74±0.96	9.13±1.20	7.07±1.22
T [value]	5.869	-4.899	3.339	9.094	9.865

Table 3: Comparison between SCA Group and Control Group in structural and functional parameters of the right arteria carotis communis (x±s)(±s)

DISCUSSION

Vessel walls lose smooth muscle cells, fibrous-transparent materials are deposited on them, wall thickness increases, and the lumen of the vessel is narrowed as a result. Ischemic strokes are often caused by SCA, which is a well-known risk factor. The ethology of the SCA is still unknown. SCA is thought to be caused by a mix of genetic and cerebrovascular disease risk factors [9]. Angiography, CT angiography, and cardiac magnetic resonance imaging can all be used to detect SCA in the patient (MRI). When it comes to examining the coronary arteries, there is no replacement for traditional coronary angiography. However, because of the invasive nature of the procedure, it can be dangerous. [14-16] It is possible that even with several projections and angiographic pictures, it will be impossible to distinguish the anatomy of intricate

DOI: https://doi.org/10.54393/pbmj.v5i2.302

examples. coronary computed tomography has emerged as the gold standard for non-invasive cardiac diagnostics when it comes to the diagnosis and characterization of cardiac anomalies [17-19]. In the treatment of patients with an atypical beginning of coronary corridor from inverse sinus with interarterial course, it is fundamental to painstakingly delineate the gamble, thinking about the gamble of unexpected heart passing from one viewpoint and the gamble of arranged intercessions then again. In patients with a high gamble of abrupt heart demise, careful treatment ought to be thought of: coronary unroofing, coronary reimplantation, or CABG [20-21].

CONCLUSION

According to the course an abnormal artery takes, SCA can be divided into several unique subgroups for better understanding. Because of the consequences for patient care, it is crucial to understand these categories. CTA angiography plays an important part in determining the kind of SCA that a patient has (CCTA).

REFERENCES

[1] Pantoni L. Cerebral small vessel disease: from pathogenesis and clinical characteristics to therapeutic challenges. Lancet Neurol 2010; 9: 689–701.

[2] Zhang WW. Advances in Cerebral Small Vessel Disease. Chin J Cerebrovascular Disease (Electronic Version), 2008; 2(4): 272-277.

[3] Schmidtke K, Hüll M. Cerebral small vessel disease: how does it progress? J Neurol Sci 2005;2(30):13-20.

[4] Bjallmark A, Lind B, Peolsson M, et a1. Ultrasonographic strain imaging is superior to conventional non-invasive measures of vascular stiffness in the detection of age-dependent differences in the mechanical properties of the common carotid artery. Eur J Echocardiography, 2010; 11: 630-636.

[5] Wang JH, Wang YH, Wu CL, et al. Quantitative evaluation of carotid elasticity in normal adults by echo tracking technique. Chin J Ultrasonogr, 2005;14(4):292-294.

[6] Wen CY, Zhuang D. Assessment of common carotid artery function in patients with systemic sclerosis by quality arterial stiffness. Journal of Clinical Ultrasound in Medicine, 2011;13(6):388-391.

[7] Lipton M. J., Barry W. H., Obrez I., Silverman J. F., Wexler L. Isolated single coronary artery: diagnosis, angiographic classification, and clinical significance. Radiology. 1979;130(1):39–47.

[8] Al Umairi R. S., Al Kindi F., Al Busaidi F. Anomalous origin of the left coronary artery from the pulmonary artery: the role of multislice computed tomography (MSCT) Oman Medical Journal. 2016;31(5):387–389.

[9] Zukic F., Miljko M., Vegar-Zubovic S., Behmen A., Arapovic A. K. Prevalence of coronary artery anomalies detected by coronary CT angiography in Canton Sarajevo, Bosnia, and Herzegovina. Psychiatria Danubian. 2017;29(4):830–834.

[10] Smettei O. A., Sayed S., Abizaid R. M. The prevalence of coronary artery anomalies in Qassim province detected by cardiac computed tomography angiography. Journal of the Saudi Heart Association. 2017;29(2):84–89.

[11] Sirasapalli C. N., Christopher J., Ravilla V. Prevalence and spectrum of coronary artery anomalies in 8021 patients: a single-center study in south India. Indian Heart Journal. 2018;70(6):852–856.

[12] Gräni C., Benz D. C., Schmied C., et al. Prevalence and characteristics of coronary artery anomalies detected by coronary computed tomography angiography in 5634 consecutive patients in a single center in Switzerland. Swiss Medical Weekly. 2016;146

[13] Graidis C., Dimitriadis D., Karasavvidis V., et al. Prevalence and characteristics of coronary artery anomalies in an adult population undergoing multidetector-row computed tomography for the evaluation of coronary artery disease. BMC Cardiovascular Disorders. 2015;15(1):p. 112.

[14] Fujimoto S., Kondo T., Orihara T., et al. Prevalence of anomalous origin of coronary artery detected by multi-detector computed tomography at one center. Journal of Cardiology. 2011;57(1):69–76.

[15] Soon K. H., Selvanayagam J., Bell K. W., et al. Giant single coronary system with coronary cameral fistula diagnosed on MSCT. International Journal of Cardiology. 2006;106(2):276–278.

[16] Shrivastava S., Mohan J. C., Mukhopadhyay S., Rajani M., Tandon R. Coronary artery anomalies in tetralogy of Fallot. Cardiovascular and Interventional Radiology. 1987;10(4):215–218.

[17] Said S. A., De Voogt W. G., Bulut S., et al. Coronary artery disease in the congenital single coronary artery in adults: a Dutch case series. World Journal of Cardiology. 2014;6(4):196–204. DOI: 10.4330/wjc.v6.i4.196.

[18] Poynter J. A., Williams W. G., McIntyre S., et al. Anomalous aortic origin of a coronary artery: a report from the congenital heart surgeons society registry. World Journal for Pediatric and Congenital Heart Surgery. 2014;5(1):22–30.

[19] Ermis E., Demirelli S., Korkmaz A. F., Sahin B. D., Kantarci A. An isolated single L-II type coronary

DOI: https://doi.org/10.54393/pbmj.v5i2.302

artery anomaly: a rare coronary anomaly. Intractable & Rare Diseases Research. 2015;4(4):203–206.
[20] Mahapatro, A.K.; Patro, A.S.; Sujatha, V.; Sinha, S.C. Isolated single coronary artery presenting as acute coronary syndrome: Case report and review. Int. J. Angiol. 2014, 23, 143–146.
[21] Ermis, E.; Demirelli, S.; Korkmaz, A.F.; Sahin, B.D.; Kantarci, A. An isolated single L-II type coronary artery anomaly: A rare coronary anomaly. Intractable Rare Dis. Res. 2015, 4, 203–206.