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ORGINAL ARTICLE

Multi-Slice Computed Tomography in Coronary Artery Disease: Detection of Disease Severity, Calcium Score and Prediction of Percutaneous Coronary Intervention Complications

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ABSTRACT

Background: Coronary artery calcifications comprise one of the most significant factors interfering with the diagnostic accuracy of Multi-Slice Computed Tomography (MSCT). Despite this fact, measurement of Coronary Artery Calcification (CAC) score using Agatston method is a useful noninvasive test for expecting rare but serious potentially life - threatening Percutaneous Coronary Intervention (PCI) complications, our aim to highlight the role of MSCT in coronary disease severity and CAC score as a predictor tool to determine PCI associated complications.

Methods: A prospective study was carried out in the period from January 2022 to May 2022, conducted at the radiology and cardiology departments of Zagzig University Hospitals, and enrolled 60 patients with 78 significant stenotic calcified coronary lesions diagnosed by conventional coronary angiography and MSCT coronary angiography with total, target vessel and significant lesion CAC scores calculation using the Agatston method prior to percutaneous coronary intervention (PCI).

Results: Our patients were divided into a lower CAC score cases (CAC score, ≤300, n=12 cases/ 12 lesions) and a higher CAC case (CAC score, >300, n=48 cases/ 66 lesions). The highest vessel CAC score mean is of LAD 100.1± 61.98 followed by RCA then LCX and lastly LM, with only three cases of higher CAC score group developed dissection during PCI. with significant difference between successful and complicated PCI regarding the total, target vessel and significant lesion CAC scores with P value < 0.02

Conclusion: Using MSCT to measure CCS prior to intervention can anticipate PCI problems and improve PCI outcomes.

Keywords: MSCT; CAC; PCI; CTA; coronary calcification

INTRODUCTION

Calcium deposition along the coronary arterial wall could reflect the severity of coronary artery disease (CAD). High (CAC) score reflects advanced disease and a higher likelihood of coronary stenosis [1]. Multi-Slice CT (MSCT) has been shown to be capable of providing information relevant for defining atherosclerotic plaque in a noninvasive manner in correlation studies with intravascular ultrasonography (IVUS) and histology [2]. Beyond coronary calcium evaluation, cardiac CT scanning is increasingly being utilized for noninvasive CT coronary angiography (CTA), which has shown good sensitivity and specificity for evaluating coronary stenosis [2]. While most recent generation MSCT scanners can do CAC scores calculations, only the most recent generation scanners have been successful in producing clinically meaningful CTA images [3]. The cross-sectional nature of contrast enhanced MSCT coronary angiography allows for more accurate quantification of total atherosclerotic plaque burden than measuring calcified components alone, as well as assessment of blood flow and evaluation of lumen and arterial wall dimensions with high resolution [4].

In contrast to noncalcified lesions, complex and highly calcified lesions often produce a lower ultimate lumen diameter and less acute lumen gain following stenting, which poses special problems for percutaneous coronary intervention (PCI) [5]. Additionally, there is a chance of the stent not expanding enough, a lower procedural success rate, and a higher frequency of acute complications [5]. Invasive intravascular ultrasonography (IVUS) is required for a thorough evaluation of calcified plaque during PCI [6], but if the target lesion has a significant degree of luminal narrowing, the IVUS catheter may not be able to pass through it [7]. MSCT can be used to non-invasively detect coronary calcification and to estimate the burden of calcified plaque, scores like the Agatston score have been utilized [8]. Previous studies proved that the complexity of PCI and complications associated to the operation are predicted by a high calcium score [9].

Per-lesion coronary calcification could help determine whether techniques are used in the next intervention [7]. Therefore, our study aimed to emphasize the usefulness of CAC scores as a straightforward, noninvasive indicator of the severity of calcified plaque, which is important for predicting challenging PCI.

METHODS

Our prospective study was approved from Zagzig University Academic and Ethical Committee (IRB Approval No. (#10081/16-1-2022). Every patient signed an informed written consent for acceptance of participation in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

The study was conducted at the Radio-diagnosis and Cardiology departments, Zigzag University hospitals in the period from January 2022 to May 2022. Sample size was calculated based on Abazid et al., [11] who reported 7.14% as a prevalence rate of post-PCI peri-procedural complications, this study required 60 patients to detect similar prevalence rate with 5% deviation and 95% confidence interval. Sample size was calculated using PASS software. Our study enrolled 60 Patients with 78 significant stenotic calcified coronary lesions, their age ranged from 42 – 71 years old, the mean of them was 57.27 ± 7.7, 38 males (63.3%) and 22 females (36.7%), diagnosed by conventional coronary angiography to have CAD with single or multiple significant stenotic lesions & scheduled to do elective CT coronary angiography for evaluation of the stenotic coronary lesions with total , target vessel and significant lesion CAC scores calculation using Agatston method prior to (PCI) and flow chart of the study design is illustrated in (Figure 1). Exclusion criteria included patients with arrhythmia, irregular heart rate, renal insufficiency (creatinine level ≥1.6 mg/dl), Inability to sustain a breath hold for 10–12 seconds, inability to comply with the protocol requirements, patients with a previous CABG operation or coronary stenting, morbid obesity, pregnant females, and a CAC score exceeding the maximum score (1000). All patients were subjected to the following: Full history taking included personal data, risk factors (DM, smoking, hypertension and hypercholesterolemia) and history of coronary intervention (CABG or stent), revision of previous laboratory investigations (renal function test (creatinine level >1.6 mg/dl) and lipid profile (total cholesterol, LDL, HDL and triglycerides), revision of previous cardiac investigations if present, especially diagnostic conventional coronary angiography that has been done at the cardiology department two to three weeks prior to the CT angiographic examination using the GE medical system (CARD AMP5127609 RE:5).in order to know the number, distribution, and degree of stenosis exerted by each lesion, MSCT coronary angiography with calcium scoring, and percutaneous coronary intervention for all patients at the cardiology department from two to three weeks following the MSCT examination using flabby wires and balloons of different sizes according to the lesion size and stent application.

MSCT Examination:

Patients were prepared as follows: all patients were instructed to avoid tea, coffee and smoking until the time of examination. Beta blockers (50 mg Atenolol or 5 mg Bisoprolol) were given to all of our patients the day before and two hours before their exams to keep their heart rates below 70 beats per minute (provided that no contraindications to B blockers existed). This increased the diastolic phase of the cardiac cycle, which facilitated the acquisition process. Patients were instructed to fast for 4-6 hours prior to the examination while continuing to take their medications as usual. Reassurance was provided, and all steps of the study were explained in detail to patients. The patients were informed that good breath holding is crucial and practice to take shallow inspiration then breath hold.

Scan protocol and parameters: Patients were examined in the supine position using a 128 multi-

Slice scanner (Philips Ingenuity Core128 TM v3.5.7.25001; Philips Healthcare Systems). ECG leads were fixed at the four corners of the pericardium, as all reconstructions were performed using retrospective ECG gating. For this technique, an ECG must be recorded simultaneously throughout the duration of the scanning. The scanogram was obtained at anteroposterior and lateral views of the chest, which extends from the level of the carina down to about 1 cm below the diaphragm. The center of the field of view was 2 cm to the left of the dorsal spine on the AP scout and at the level of the hilum on the lateral scout. Images were acquired with slice thickness; 0.6 mm, tube current up to 430 mA at 120 kV, tube rotation; and a 300 ms gantry rotation time.

Coronary calcium scoring was done with a single breath-hold non contrast scan and calcium quantification via the Agatston score. The MSCT measurement of CAC score with the Agatston method in our study was as follows: measuring the total CCS for all coronary vessels, measuring the CAC scores for the target vessel and measuring the CAC score for each specific lesion. Using total calcium score, grading of coronary artery disease was performed based on Arjmand, [10] in which Score 0 stood for no evidence of CAD, score 1-10 for minimal CAD, score 11-100 for mild CAD, score 101-400 for moderate CAD, score 401-1000 for severe CAD (if CAC score exceeds 1000, the examination is cancelled).

The acquisition for CTA: using a bolus tracking method, 70–80 mL of non-ionic contrast medium (Ultravist 370 mg of iodine per ml) was injected at 5–6 mL/sec through the dual-head power injector pump with (50mL) saline chaser bolus to wash out the CM from the right side of the heart and image acquisition started once the contrast threshold reach 180 HU with ROI placed on the descending aorta. A series of axial images from the aortic root (at the level of the origin of the left coronary artery) to heart base (1cm below diaphragm) were obtained. During the scan, the ECG signal was recorded digitally. Patients were automatically instructed to maintain an inspiratory breath hold while the CT data and the ECG trace were acquired.

Interpretation of images:

Image reconstruction and post processing: All images were transferred to the workstation (Philips IntelliSpace workstation) for post processing using comprehensive cardiac analysis software. For analysis of the small and tortuous coronary arteries, it was of importance to keep the reconstructed slice thickness for the coronary axial slices as thin as possible. We selected the most appropriate set of images for coronary artery visualization and reconstruction. As a general rule in the CT definition of Philips, the best diastole phase range is 70-80% of the R-R interval of the cardiac cycle, while the best systole phase range is 40-50% of the R-R interval. Multiplanar reconstruction (MPR) (oblique and curved), Maximum intensity projection (MIP) and Volume rendering techniques(3D-VR) were applied.

Image interpretation of coronary lesions: MIP was considered the modality of choice used to identify the coronary lesions while the degree of stenosis was evaluated primary on the axial scans and MPR (specially the curved reformatted images)

Analysis of the coronary artery tree was done as following: (1) Revision of axial images for full identification of the coronary anatomy included the origin, course, caliber and branches of each coronary artery. (2) Detection and localization of coronaries lesions, avoiding sections and angulations with potential image artifacts. (3) Calcified coronary lesions were divided based on their total CAC scores mean into: a lower CAC score (CAC score, ≤300, n=12 cases/ 12 lesions) and a group with a higher CAC score (CAC score, >300, n=48 cases/ 66 lesions). (4) Qualitative and quantitative assessment of vessel obstruction caused by the lesion using the software and scale calibration, automatic determination of the degree of stenosis was available with possible manual editing when necessary :Reduction of the luminal diameter by less than 50% was consistent with non-significant stenosis, If the luminal diameter reduction exceeds 50%, the process was consistent with hemodynamically significant stenosis, while the term vessel occlusion meant: 100% lumen obstruction So, we evaluate CAD according to the following aspects: Number of affected vessels, Location of lesion: proximal, middle or distal portion of vessel, Extension of the lesion: Focal, diffuse, concentric or eccentric, Degree of obstruction exerted by the lesion, Component of the lesion (Calcified, mixed, or soft plaques) and evaluation of calcified lesions according CAC score (lower CAC score, ≤300,) and (higher CAC score, >300).

Percutaneous coronary intervention (PCI) data: Angiographic PCI success was defined as a final thrombolysis and <10% residual stenosis with no procedural complications such as no reflow, perforation or dissection.

Statistical Analysis:

All data were collected, tabulated and statistically analyzed using SPSS 22.0 for windows (SPSS Inc., Chicago, IL, USA) & MedCalc 13 for windows (MedCalc Software bvba, Ostend, Belgium). Quantitative data were expressed as the mean ± SD & median (range), and qualitative data were expressed as an absolute frequencies "number" & relative frequencies (percentage). Continuous data were checked for normality by using Shapiro Walk test. Independent Student t-test was used to compare two groups of normally distributed data. Percent of categorical variables were compared using Chi-square test or Fisher's exact test when appropriate. All tests were two sided. $p < 0.05$ was considered statistically significant (S), $p < 0.001$ was considered highly statistically significant (HS), and $p \geq 0.05$ was considered non statistically significant (NS).

RESULTS

Our current prospective study enrolled 60 patients with 78 significant stenotic calcified coronary lesions with prior conventional diagnostic angiographic study and MSCT with CAC scores measurement then all the included patients underwent PCI.

The age of the studied patients ranged from 42 – 71 years old, the mean of them was 57.27 ± 7.7, 38 males (63.3%) and 22 females (36.7%), all 60 patients were divided into lower CAC score (≤ 300, n=12 with 12 stenotic calcified coronary lesions) and higher CAC score (>300, n=48 with 66 stenotic calcified coronary lesions).

Regarding the age and sex, the older age with male gender predominance was noted at the high CAC score patients than those of the low CAC scores. Furthermore, the hypertension was the most presentable risk factor at both groups followed by smoking, hyperlipidemia and lastly DM. Among the 78 significant stenotic calcified coronary lesions; 12 lesions with low CAC scores were ≤ 300 and 66 lesions were with high CAC scores are > 300. The LAD was the most affected vessel (32 lesions) followed by RCA (22 lesions) then LCX (16 lesions) and lastly LM (8 lesions) (Table 1). The means and SD of MSCT measured calcium scores in the affected coronary arteries were higher at the LAD 100.1± 61.98 followed by RCA then LCX and lastly LM (Table 2). The sixty studied patients were classified according to their total CAC score mean into mild (3 patients), moderate (43 patients) and sever (14 patients) CAD (Table 3). There was no significant difference in total, affected vessel, and specific lesion CAC score between patients with lower CAC score and patients with higher CAC score groups as regards calcium score in coronary arteries diagnosed by CT in the studied patient's group (Table 4). There was significant difference between the degree of stenosis measured by MSCT angiography versus that measured by the conventional angiography at high CAC scores (>300) lesions, while there was no significant difference between them at low CAC scores (≤300) lesions. (Table 5).

There was significant difference between successful and complicated PCI regarding the MSCT measured total, target vessel and significant lesion CAC scores while there was no significant difference between them at demographic data, risk factors or length of the significant lesion. (Table 6).

Table (1): Comparison between patients with lower CAC score (≤300) and higher CAC score (>300) patients as regard demographic data, risk factors, number distribution and site of significant stenotic calcified coronary lesions.

	Lower CAC scores (N.12)		**Higher CAC scores (N.48)**	
	No.	%	No.	%
Age (years) Mean ± SD Median (Range)	51.5 ±7.09 49.5(42-71)		58.19 ±8.39 56(42-68)	
Sex Male Female	7 5	58.3% 41.7%	31 17	64.6% 35.4%

Risk Factors. Hypertension Diabetes mellitus Hyperlipidemia Smoking	10 6 5 7	83% 50% 41.7% 64.6%	45 11 19 31	93.75% 32.9% 39.6% 58.3%
Significant stenotic calcified coronary lesions Number of lesions (78)	12	15.38 %	66	84.62 %
Site of lesions. **LM (8)** **LAD (32)** **LCX (16)** **RCA (22)**	1 6 2 3	8.3% 50% 16.6% 25%	7 26 14 19	10.6% 39.3% 21.2% 28.7%

Table (2): Calcium score in coronary arteries measured by MDCT among the studied patient's group (N.60).

	Vessel involved	No of cases	No of lesions	Mean	SD
Ca score	**LM**	**7**	**8**	**30.5**	**18.77**
	LAD	**25**	**32**	**100.08**	**61.98**
	LCX	**12**	**16**	**68.6**	**40.56**
	RCA	**16**	**22**	**75.4**	**46.1**
	Total	**60**	**78**	**300**	**98.8**

Table (3) Grading of CAD in patients with calcified coronary lesion according to their calcium score. (N.60)

Ca score	No of patients	CAD grade
1-10	-	Minimal
11-100	3	Mild
101-400	43	Moderate
401-1000	14	Sever

Table (4): Comparison between patients with lower and higher CAC scores as regard total, target vessel and significant lesions calcium score

	Lower CAC score≤300 (N.12)	Higher CAC score>300 (N.48)	P*
Total Calcium score			
Mean ± SD	210.7 ±55.9	415 ±50.90 0.001	0.001
Median (Range)	195(85-300)	420(301-480)	
Target vessel Calcium score			
Mean ± SD	58.56 ±34.6	110.8 ±37.5	0.04
Median (Range)	70(20-180)	200(50-260)	
Significant lesion Calcium score			
Mean ± SD	71.89 ±13.43	129.5 ±31.03	0.02
Median (Range)	80(50-90)	120(90-180)	

P* value < 0.05 is significant.

Table (5): Comparison between findings of MDCT angiography and conventional angiography with lower (≤300) and higher CAC score (>300) as regard calcium score regarding the degree of coronary stenosis in the studied lesions (N.78).

MDCT degree of stenosis relative to angiography	Lower CAC score≤300 (N.12)	Higher CAC score>300 (N.66)
Concordant	7	57
Over estimated	5	5
Underestimated	-	4
P-value	0.017	0.88

P < 0.05 is significant.

Table (6). Comparison between successful and complicated percutaneous coronary intervention (PCI) among the studied group of patients:

	Successful PCI	Complicated PCI	P (value)
No. of patients	57	3	
Demographic data Age (mean ±SD) Male /Female, (n)	 56 ±11 36/21	 61 ± 8 2 /1	 0.3 0.08
Risk factors (n%) hypertension Smoking Hyperlipidemia Diabetes mellitus	 52 (91.2%) 36 (63%) 22 (39%) 16 (28%)	 3 (100%) 2 (66.6%) 2(66.6%) 1 (33.3%)	 0.24 0.45 0.15 0.32
Total CAC score, mean ± SD	312 ±52.9	450 ± 28.9	0.020
Target vessel CAC score, mean ± SD	95 ± 53.6	225 ± 35.4	0.003
Significant lesion CAC score, mean ± SD	75 ± 32.5	130 ± 43.5	0.018
Lesion length, mean ± SD (mm)	24 ± 8	21 ± 5.4	0.15

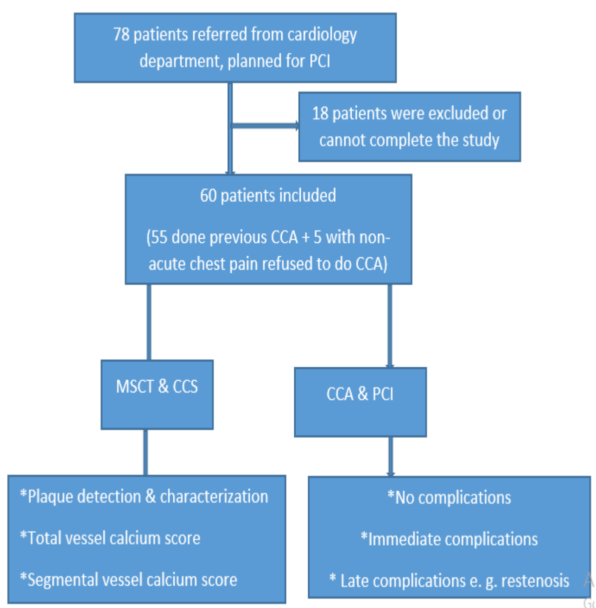

Fig.1: Flow chart of the study design. CCA: Conventional coronary angiography; MSCT**:** Multi-Slice computed tomography; CCS: Coronary calcium score; PCI: Percutaneous Coronary Intervention.

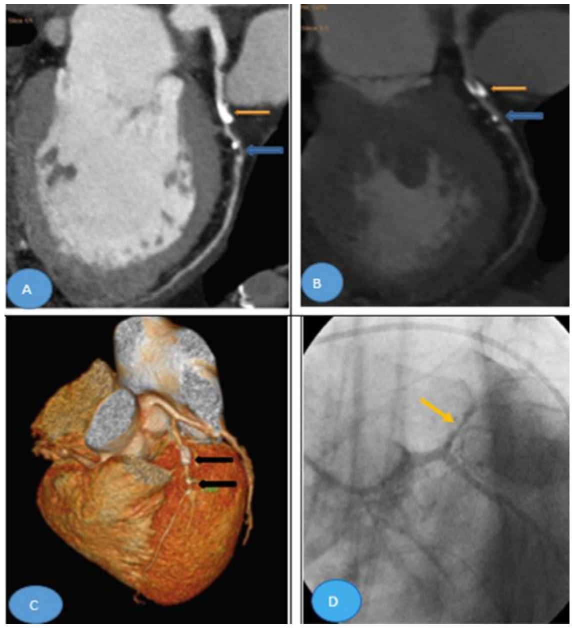

Fig.2: CMPR image of LAD at MIP (A) and bone window (B) reveal; The proximal segment demonstrates heavy calcified plaque (7mm length) with blooming artifact (orange arrow) exerting luminal stenosis up to 80% followed shortly by mid LAD mixed plaque (9mm length) exerting luminal stenosis for about 65%(blue arrow). (C) 3D-volume rendered image of the heart: Showing the LM coronary artery give rise to LAD & LCX. LAD calcified plaques are noted (arrows) (D) conventional angiographic picture for LMC, proximal LAD and LCX confirms significant stenotic lesion at proximal LAD (yellow arrow). Ca score of calcified plaques was 264 (Moderate CAD), The PCI of proximal LAD calcified lesion was complicated by discection.

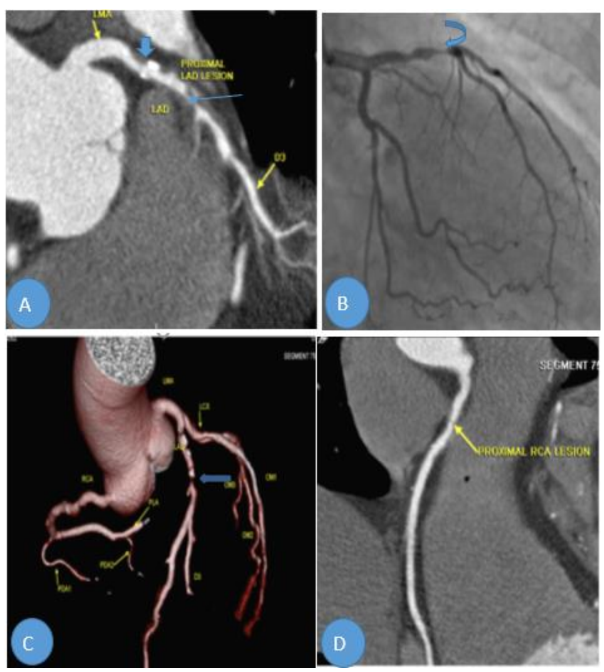

Fig. 3: A. CMPR image of LAD; Shows mixed plaque with marginal calcification in proximal LAD segment extend for about 35mm and exerting significant luminal stenosis for about 50% & 90 % at two consequent short segment (broad and long arrows respectively). The diagonal branches have no stenotic segments or calcified plaque. The distal LAD shows preserved caliber till cardiac apex B. Conventional coronary angiography of LAD confirming the presence of proximal LAD two consequent short stenotic segments (curved arrow) with degree of stenosis about 50 % & 85% respictively .C. VR image of coronary arterial tree; Showing multiple calcified plaque at proximal LAD segment with significant stenosis (arrow). D. CMPR of RCA; demonstrate proximal small non-significant soft plaque (arrow) that also can be noted at VR. The lesions has Ca score 164 on MSCT (Moderate CAD)and were treated with successefull PCI .

DISCUSSION

Percutaneous coronary intervention (PCI) was the gold standard of therapy for symptomatic coronary artery disease [12]. The incidence of peri-procedural myocardial infarction, which was about 3.5% despite advances in PCI technology and medication, mostly brought on by procedure complications like stent thrombosis, side branch blockage, coronary artery dissection, and perforation [11](Fig.2). Lesion complexity was a key factor in predicting the effectiveness of PCI; more calcified lesions were linked to lower success rates and worse clinical outcomes. In fact, an atheroma was classified as an advanced atherosclerotic lesion if calcium was present [13]. Calcium quantification of coronary atheromatous plaque was precisely assessed by using Agatston method of cardiac MSCT in the form of CAC scores grading [12]. The facilitation of risk-benefit analysis and procedural planning were achieved by estimating the risk of PCI problems [14]. To the best of our knowledge, there are few studies were carried out to study the role of CAC score in the prediction of complicated PCI, therefore, our research may clarify the validity and reproducibility of CAC score in the prediction of complicated PCI.

Our current prospective study enrolled 60 patients (38 men and 22 women) with their ages ranged from 42 to 71 years old, with a mean of 57± 7.7 years, all cases underwent conventional coronary angiography, MSCT and CAC scores calculation, with detectable 78 substantially stenotic calcified coronary lesions , all the patients underwent PCI, with three complicated PCI cases, with their CAC scores were more than 300, those patients developed dissection of the affected coronary artery during PCI sitting, these results were nearly similar to the study of Abazid et al. [11] which included 84 patients, of them six patients with high CAC scores developed peri-procedural complications, four of them had dissection, and the other two cases had immediate in stent thrombosis and angina[11].

Recent research showed that CAC scores more than 300 were a robust predictor of adverse cardiac events and offered prognostic information for coronary disease patients [15]. As a result, our study calcified stenotic lesions were divided into two groups based on their CAC scores: a group a lower CAC score (CAC score, ≤300, n=12 cases/12 lesions) and a group with a higher CAC score (CAC score, >300, n=48 cases/ 66 lesions)

Based on our observations and the grading of the CAC score, our findings revealed mild CAD in 3 patients (5%), moderate CAD in 43 patients (71.7%) (Fig.3), and severe CAD in 14 patients (23.3%), these results went hand in hand with previous study [16]. In addition, the means and SD of the MSCT measured calcium scores in the affected coronary arteries showed that the LAD 100.1± 61.98 was more than RCA, LCX, then LC, and finally LM. This is consistent with the findings of Gamal et al. [16] who reported that the LAD artery was the most often affected vessel [40%] (LAD 24/60) compared to 30% (RCA 18/60), 15% (LCX 9/60), and 3.4% (LM 2/60).

There was no significant difference between the two imaging modalities for the degree of coronary artery stenosis caused by calcified lesions in lower CAC score group with concordance seen in about 82% of cases. However, only about 60% of patients with higher CAC score group had concordance of the degree of stenosis, suggesting that about 40% of higher CAC score group were exerting statistically significance. According to Zhang et al. [17], 32% of patients with extensive calcified lesions had statistically significant overestimations of their degree of stenosis. With small, calcified lesions, concordance happened in roughly 90% of cases [17]. Among the successful and complicated PCI groups, there was no statistically significant difference between them based on the demographic findings, risk variables and length of the major lesion; this was consistent with previous research by Wang et al. [18] and Abazid et al. [11]. However, Wang et al. [12] disapproved of these aspects in the current study, as higher CCS group were significant older than the lower CCS group patients (69.2 ±8.5 vs. 61.9 ±10.1 years, P 0.001).

Regarding total, target vessel and particular lesion CAC scores differences, there was no significant difference in the CAC scores between PCI complicated and non-complicated cases among a higher CAC scores cases with a heavily calcified lesion, which was consistent with the study conducted by Aoi et al. [19]. CAC score was also significant between PCI complicated and non-complicated patients in general [19]. The quantity of coronary calcium evaluated by total, target vessel, or segmental CCS can strongly predict postoperative success and problems in the current investigation, which was consistent with study by Wang et al. [18], which showed that heavy coronary calcification assessed by MSCT can predict periprocedural myocardial infarction in patients undergoing elective PCI, according to research by Abazid et al. [11], also reported the same outcome. Additionally, the CAC score measurement was used to confirm a substantial difference between successful and challenging PC cases. These findings were consistent with earlier findings by Sinitsyn et al. [20] who noted a proportionate relationship between high CAC score and PCI-related complications. as well Mehran et al. [21] was in line with Gerreux et al. [22] who reported that severe calcification of the coronary target lesion assessed by CAC scores can independently predict major bleeding events after PCI in patients presenting with acute coronary syndrome, Mehran et al. [21] stated that higher calcification and plaque burden by pre-intervention was associated with creatine kinase-myocardial band elevation after coronary intervention. The findings of our study may be consistent with those of earlier researches [11,18,20-22], that suggested CAC scores data may be useful in management decisions when the choice between PCI and coronary artery bypass graft is unclear. Additionally, it probably will play important significance in selecting the right type of stent to get the best pre-dilatation therefore, we urged additional research to determine the significance of CAC score measured by MSCT prior to PCI.

The study had many limitations. First, only a single center was used to conduct this study. Therefore, larger multi-center investigations are necessary for confirmation the availability of long-term follow-up information for the full study population precluded the drawing of any conclusions regarding the impact of peri-procedural complications on longer-term risk of major adverse cardiac events. Secondly, the relatively small sized sample size, so larger cohort studies are recommended to validate the results of the current research.

CONCLUSIONS

MSCT angiography is a non-invasive approach for assessing CAD that has good quality and sensitivity when compared to invasive coronary angiography. Although more instances are needed to assess the relevance of CAC scores assessment as a predictor of PCI problems in general, it can be used to enhance the outcome of PCI in heavily calcified coronary lesions prior to intervention.

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