

The Diagnostic Value of Single Photon Emission Tomography (SPECT) Stress Test in Diabetic Patients With Suspected Coronary Artery Disease in Correlation to Invasive Coronary Angiogram

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Abstract

Invasive coronary angiography (ICA) is the gold standard procedure for the diagnoses of coronary artery disease (CAD). ICA allows for clear visualization of the coronary arterial blood flow. Single-photon emission computed tomography (SPECT) is currently in widespread use to non-invasively evaluate patients known or suspected of coronary artery disease (CAD). Our aim is to examine the association between (SPECT) stress test and elective ICA in terms of diagnostic value in patients suspected of coronary artery disease at the King Faisal Cardiac Center (KFCC) Jeddah Saudi Arabia.

Introduction

The World Health Organization reported coronary artery disease (CAD) as one of the Major causes of mortality, killing around 7 million people annually. The overall prevalence of CAD in Saudi Arabia is estimated to be 5.5%. Therefore effective diagnosis of CAD is required using a safe and accurate diagnostic procedure to risk stratify patients appropriately. Nowadays, invasive coronary angiography (ICA) is the procedure of choice for an accurate diagnosis of CAD. ICA allows for clear visualization of the coronary arterial blood flow, which helps to diagnose, and risk stratify patients and provide a mode for delivering therapy. However, ICA is occasionally not easily accessible and not widely accepted by many patients as majority prefer non-invasive diagnostic tests. In addition ICA is an invasive procedure though safe but not without complications. such as acute kidney injury, stroke, and arrhythmia, and a mortality rate of 0.45%.

The use of the nuclear stress test is relatively safe, most of the side effects are minimal and transient, and the majority are linked to the pharmacological stressors used. However, two case series studies have reported coronary vasospasm as a rare adverse outcome occasionally occurring during or after an adenosine stress test.

Although ICA is considered the gold standard for detecting of clinically significant CAD, the new generation high speed HS-SPECT provides high image quality and similar overall diagnostic accuracy to ICA, Combined supine and prone stress imaging provided the best diagnostic accuracy. Our study aims to examine the association between (SPECT) stress test and elective ICA in terms of diagnostic value in patients suspected to have coronary artery disease at the King Faisal Cardiac Center from January 2015 to January 2020.

Methods and Materials

This study is a retrospective case-control study using a consecutive sampling technique to select the study sample at KFCC. The study included all patients presented with chest pain that was investigated with either exercise or pharmacologic myocardial perfusion SPECT study followed by elective ICA within six months from January 2015 to January 2020.

Results

207 patients met the inclusion criteria. forty-three percent (n = 90) of patients were females, and 57% (n = 117) were males. Sixty-eight percent (n = 141) of the patients had both tests results concordant (both SPECT and

ICA results were in agreement). In 32% of the patients (n = 66) there were a discordant result (discrepant result between SPECT and ICA). SPECT had a sensitivity of 92.4% and a specificity of 26.3%. SPECT had a negative predictive value of 0.68 and a positive predictive value of 0.66 compared to ICA. There was a low degree of reliability between SPECT and ICA.

Result	ICA		Total
	Negative	Positive	
SPECT	Negative	10	30
	Positive	56	177
Total	76	131	207

Table 1. ICA and SPECT results for the whole study population.

Characteristic	Discrepancy, N = 66	Agreement, N = 141	P-value
Gender			0.041
Female	(%55) 36	(%38) 54	
Male	(%45) 30	(%62) 87	
Age			0.3
Mean (SD)	(12) 63	(11) 66	
BMI			0.14
Mean (SD)	(8) 33	(10) 32	
Smoking			0.9<
No	(%88) 58	(%89) 125	
Yes	(%12) 8	(%11) 16	
DM			0.029
No	(%33) 22	(%18) 26	
Yes	(%67) 44	(%82) 115	
HTN			0.13
No	(%29) 19	(%18) 26	
Yes	(%71) 47	(%82) 115	
DYS			0.6
No	(%32) 21	(%36) 51	
Yes	(%68) 45	(%64) 90	
CKD			0.9<
No	(%98) 65	(%97) 136	
Yes	(%1.5) 1	(%2.9) 4	
Unknown	0	1	
HF			0.9<
No	(%68) 45	(%67) 95	
Yes	(%32) 21	(%33) 46	
HbA1c			0.001>
Median (IQR)	(7.40 ,5.80) 6.50	(8.70 ,6.50) 7.60	
Creatinine			0.3
Median (IQR)	(96 ,86) 78	(104 ,89) 81	
HDL			0.12
Median (IQR)	(1.19 ,0.84) 1.00	(1.06 ,0.80) 0.95	
LDL			0.4
Median (IQR)	(2.96 ,1.85) 2.48	(2.92 ,1.81) 2.33	

Table 2. Demographics, comorbidities, and laboratory results in discrepant and agreement groups.

Conclusions

Reliability between the SPECT and ICA in exclusion of significant CAD is high. The rate of false positive tests was high while the accuracy of SPECT in detecting CAD in patients with diabetes and hypertension was high. The overall reliability of SPECT to ICA in Saudi population was low.

References

