

# CORRELATION BETWEEN LEFT VENTRICULAR FUNCTION AND MYOCARDIAL BLUSH GRADING IN PATIENTS WITH ISCHEMIC HEART DISEASE

By

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## ABSTRACT

**Background:** Myocardial blush is a simple, widely available, and virtually costless technique for the immediate diagnosis of microvascular impairment, and confirms myocardial tissue-level perfusion at time of coronary angiography. **Objective:** Emphasizing the correlation between left ventricular functions and angiographic evidence of myocardial blush grade (MBG) in patients with ischemic heart disease (IHD). **Patients and Methods:** The present study included fifty patients who had been admitted to AL-Azhar University Hospital (Damietta) between February 2015 and October 2015 by IHD, and eligible to coronary angiography. Patients in the study were subjected to full history with special emphasis on age, sex, other risk factors for coronary artery disease (CAD), and analysis of anginal pain. Echocardiography to assess LV functions was done immediately before coronary angiography and assessment of MBG. **Results:** The mean age of studied cases was 56.5 years. Most of our cases were males (68%), and the most frequent risk factor was hypertension (54%). Ejection fraction was within normal limits in 54% of cases. Mild, moderate and severe impairment of LV systolic functions were found to be 24, 10 and 12 % respectively. Most of the patients (47 for right coronary, 43 for left circumflex and 44 for left anterior descending arteries) had thrombolysis in myocardial infarction (TIMI) grade III. Myocardial blush grading was assessed for both right and left coronary arteries. The most frequent finding was grade III for both left (50%) and right (62%) systems, and the least was grade I for left (16%) and right (10%) systems. Impaired MBG of the left coronary system was associated with old age, male sex and low blood pressure, while right coronary system had no such association. Impaired MBG of both right and left coronaries was related to impairment of left ventricular systolic function, but not related to diastolic function. Also, degree of MBG was related to degree of TIMI on both right and left coronaries. In contrast, degree of systolic function by echocardiographic assessment was not related to TIMI of right coronary system or TIMI left circumflex (LCX) artery. Finally, MBG was related to degree of stenosis of all coronary arteries except LCX artery. **Conclusion:** Myocardial blush grade was correlated with left ventricular systolic function. Impaired myocardial blush grade was related to TIMI and degree of coronary stenosis. Impaired MBG of left system was associated with old age, male sex and low blood pressure.

**Key words:** Myocardial blush grades, Ischemic heart disease, Left ventricular function.

## INTRODUCTION

Perfusion can be defined as tissue blood flow at the capillary level, which can be described in term of velocity and volume. Because there are no arterio-venous connections in the human heart,

under normal circumstances, any blood entering the coronary artery will reach the capillaries, and thus flow measured at any level of coronary tree will reflect tissue perfusion (*Chilian et al., 2011*). Angiographic “blush” is a simple widely available and virtually costless technique

for the immediate diagnosis of microvascular impairment at the time of catheterization. Myocardial perfusion grade is the angiographic method currently preferred to confirm myocardial tissue-level perfusion after coronary angiography (*Porto et al., 2010*). Immediately after reperfusion in patients with acute myocardial infarction, myocardial blood volume decreases in proportion to the extent of necrosis, while blood velocity generally increases above baseline pre-occlusion levels. The decrease in blood volume is caused by capillary injury and plugging resulting in "no-reflow" in the capillaries. The increase in blood velocity is secondary to reactive hyperemia that lasts for several hours after reperfusion (*Kloner et al., 2012*). In patients after reperfusion therapy, the myocardial blush grade, as seen on the coronary angiogram, is a predictor of left ventricular function, and can be used to describe the effectiveness of the myocardial reperfusion. Myocardial blush grade (MBG) tends to be impaired when ischemic time is prolonged, infarct size is larger, and when distal embolization is evident (*Bethke et al., 2015*). It is reported that MBG is related to TIMI flow in the epicardial vessel. However, almost one third of patients with TIMI 3 flow have MBG 0/1, indicating poor perfusion at the tissue level. This impaired myocardial perfusion is associated with relatively more extensive necrosis and, as a consequence, is a predictor of poor regional and global contractile function, with predictive power beyond TIMI flow (*Stone et al., 2012*).

The present work aimed to emphasize the correlation between left ventricular functions and angiographic evidence of

myocardial blush grade in patients with ischemic heart disease.

## PATIENTS AND METHODS

This study included fifty patients presented with anginal pain and were eligible for coronary angiography at Cardiology Department of Al-Azhar University Hospital (Damietta) during the period from February 2015 to October 2015.

### *Inclusion criteria*

1. Acute coronary syndrome (ACS): Cases of ST elevation myocardial infarction and non ST elevation ACS as unstable angina or non ST elevation myocardial infarction in the presence of intermediate or high risk according to TIMI score.
2. Stable angina with occurrence of recurrent chest pain in spite of medical treatment.
3. Stable angina with high risk criteria by stress testing.

### *Exclusion criteria*

1. Poor echocardiography window.
2. Previous myocardial infarction.
3. Previous coronary artery bypass grafting

Written informed consent was obtained from each patient to perform the coronary angiography.

All patients were subjected to full history taking, clinical examination and laboratory investigations for CBC, creatinine, random blood glucose, INR, serum troponin I, and electrocardiogram (ECG).

Using transthorathic probe of Phillips IE 33 echo device, echocardiography was performed (according to recommended

methods by American Society of Echocardiography) to assess left ventricular systolic function by M mode (teichholz method) in the left parasternal long axis view, or using Simpson's methods if there was SWMA, or altered LV geometry, and was grade into three grades (**Lang et al., 2015**).

Left ventricular diastolic dysfunction was graded into 3 grades using the Pulsed-wave mitral valve inflow method in patients with sinus rhythm (**Sipic et al., 2013**).

Using Philips Allura F.D (10/10), the myocardial blush grade (MBG) was graded on the angiograms. Angiographic runs had to be long enough to allow some filling of the venous coronary system to be certain of adequate contrast filling of the epicardial and intramyocardial coronary vessels. All angiograms were made with 6F diagnostic catheters in a standardized fashion (**Brener et al., 2013**).

**Statistical analysis:** The collected data were organized, tabulated and statistically analyzed using statistical package for social sciences (SPSS) version 19 (SPSS Inc, Chicago, USA), running on IBM compatible computer. Frequency and percent distributions were calculated, and the Chi square ( $X^2$ ) test was used. Mean and standard deviation (SD) were calculated. One way ANOVA, least significant difference (LSD) test and correlation co-efficient (t-test) were used. For all tests, p value <0.05 were considered significant.

## RESULTS

The mean age of studied cases was  $56.5 \pm 8.1$  years. Most of our cases were males (68%), and the most frequent risk factor was hypertension (54%). Mean systolic and diastolic blood pressure were  $126.4 \pm 13.7$  and  $78.6 \pm 9.9$  respectively (Table 1).

**Table (1):** General characteristics of studied cases (mean  $\pm$  SD).

Variables	Findings
Age	$56.5 \pm 8.1$
Gender	
Male: No (%)	34 (68)
Female: No (%)	16 (32)
Risk factors	
Hypertension: No (%)	27 (54)
Smoking: No (%)	18 (36)
Diabetes mellitus: No (%)	17 (34)
Dyslipidemia: No (%)	20 (40)
Heart rate (b/m)	$77.8 \pm 8.6$
Systolic blood pressure	$126.4 \pm 13.7$
Diastolic blood pressure	$78.6 \pm 9.9$

The mean ejection fraction was  $54.3 \pm 12.1$ . The mean end systolic and diastolic dimensions were  $39.9 \pm 8.3$  and

$56.1 \pm 8.8$  respectively. The mean fraction shortening was  $26.9 \pm 7.1$  (Table 2).

**Table (2):** Echocardiographic findings of studied cases (mean  $\pm$  SD).

Variables	Findings
Ejection fraction (%)	$54.3 \pm 12.1$
End diastolic dimensions (mm)	$56.1 \pm 8.8$
End systolic dimensions (mm)	$39.9 \pm 8.3$
Fraction shortening (mm)	$26.9 \pm 7.1$

The most frequent finding about diastolic function was grade I (64%) , and the least was grade III (8%) (Table 3).

Table (3): Diastolic dysfunction of studied cases

Grades	Count	No.	%
Grade I		32	64
Grade II		14	28
Grade III		4	8

Ejection fraction was within normal limits in most of our cases (54%). Mild, moderate and severe impairment were

found to be 24, 10 and 12 % respectively (Table 4).

**Table (4):** Degree of ejection fraction among studied cases

Parameters	Count	No.	%
Normal (> 55%)		27	54
Mild impairment (45-54%)		12	24
Moderate impairment (30-44%)		5	10
Severe impairment (<30%)		6	12

The most frequent finding about MBG was grade III for both left (50%) and right (62%) systems, and the least was grade I

for left (16%) and right (10%) systems (Table 5).

**Table (5):** Myocardial blush grading among studied cases

<b>Systems</b> <b>Grades</b>	<b>Left coronary system</b>	<b>Right coronary system</b>
Grade I	8 (16)	5 (10)
Grade II	17 (34)	14 (28)
Grade III	25 (50)	31 (62)

Most of the patients (47 for RCA, 43 for LCX and 44 for LAD) had TIMI grade III (Table 6).

**Table (6):** TIMI grading of studied cases

<b>Cases</b> <b>Grades</b>	<b>TIMI RCA</b>	<b>TIMI LCX</b>	<b>TIMI LAD</b>
Grade I	2	1	4
Grade II	1	6	2
Grade III	47	43	44

Impaired myocardial blush (grade I) of the left coronary system was associated with increased age ( $p=0.034$ ), male sex ( $P=0.039$ ) and decreased both systolic and diastolic blood pressure ( $P=0.003$  and

$0.018$  respectively), with statistically significant difference, while there was no significant difference regarding heart rate ( $P=0.14$  - Table 7).

**Table (7):** Comparison between myocardial blush grades of the left coronary system and patient's characters (mean  $\pm$  SD).

<b>Grades</b> <b>Characters</b>	<b>Grade I</b> <b>(n=8)</b>	<b>Grade II</b> <b>(n=17)</b>	<b>Grade III</b> <b>(n=25)</b>	<b>P</b>
Age (years)	63.4 $\pm$ 5	57 $\pm$ 8	55.2 $\pm$ 7.8*	0.035
Gender				
Male (%)	8(100)	12 (71)	13 (52)	0.039
Female (%)	0 (0)	5 (29)	12 (48)	
Heart rate (b/m)	74.9 $\pm$ 7.5	79.8 $\pm$ 6.4	77.3 $\pm$ 10.1	0.39
Systolic BP	113.8 $\pm$ 12	133 $\pm$ 13.6*	125.2 $\pm$ 11	0.002
Diastolic BP	71.2 $\pm$ 6.4	83.5 $\pm$ 10.6*	78.8 $\pm$ 9.7	0.017

\*: significantly different from group I.

There was no statistically significant difference between grading of myocardial blush of the right coronary system with age ( $p=0.37$ ), sex ( $P=0.067$ ), both systolic

and diastolic blood pressure ( $P=0.11$  and  $0.32$  respectively), and heart rate ( $P=0.5$  - Table 8).

**Table (8):** Correlation between myocardial blush grades of the right coronary system and patient's characters (mean  $\pm$  SD).

Characters	Grades			P
	Grade I (n=5)	Grade II (n=14)	Grade III (n=31)	
Age (years)	58 $\pm$ 6.3	59.9 $\pm$ 6.4	55.7 $\pm$ 8.6	0.26
Gender				0.101
Males (%)	4 (80)	12 (86)	17 (55)	
Females (%)	1 (20)	2 (14)	14 (45)	
Heart rate (b/m)	74.4 $\pm$ 6	78.5 $\pm$ 6.9	78.7 $\pm$ 10.4	0.62
Systolic BP (mm Hg)	116 $\pm$ 13.4	123.6 $\pm$ 15.5	129 $\pm$ 12.2	0.99
Diastolic BP (mm Hg)	74 $\pm$ 5.5	77.9 $\pm$ 11.9	80.6 $\pm$ 10	0.37

Impaired myocardial blush of the left coronary system was associated with decrease in ejection fraction and fraction shortening, while there was an increase in

end systolic and diastolic dimensions; all with statistically significant difference ( $P=<0.001$  - Table 9).

**Table (9):** Comparison between myocardial blush grades of the left coronary system with left ventricular dimensions and systolic function (mean  $\pm$  SD).

Parameters	Grades			P
	Grade I (n=8)	Grade II (n=17)	Grade III (n=25)	
Ejection fraction (%)	39.2 $\pm$ 6.4	56.1 $\pm$ 8.6*	57.8 $\pm$ 12*	<0.001
End diastolic dimensions (mm)	68.4 $\pm$ 4	57.3 $\pm$ 5.6*	51.6 $\pm$ 6.9*	<0.001
End systolic dimensions (mm)	52.5 $\pm$ 5.4	39.3 $\pm$ 5.1*	36.4 $\pm$ 6.8*	<0.001
Fraction shortening (mm)	18 $\pm$ 2.8	28 $\pm$ 7.3*	28.9 $\pm$ 5.9*	<0.001

\*: significantly different from group I.

Impaired myocardial blush of the right coronary system was associated with decrease in ejection fraction and fraction shortening, while there was an increase in

end systolic and diastolic dimensions; all with statistically significant difference ( $P=0.001-0.003$  - Table 10).

**Table (10):** Comparison between myocardial blush grades of the right coronary system with left ventricular dimensions and systolic function (mean ± SD).

<b>Parameters</b> \ <b>Grades</b>	<b>Grade I (n=5)</b>	<b>Grade II (n=14)</b>	<b>Grade III (n=31)</b>	<b>P</b>
Ejection fraction (%)	43.2±9.5	48.3±11.9*	57.9±11*	0.005
End diastolic dimensions (mm)	60.6±5	61.9±9.3	53.2±7.5*#	0.003
End systolic dimensions (mm)	47±5.3	44.9±9.5	37±6.2*#	0.001

\*: significantly different from group I.  
#: significantly different from group II.

Myocardial blush grading had a strong positive correlation with EF, while it had strong negative correlations with end

systolic and end diastolic dimensions with statistically significant values (Table 11).

**Table (11):** Correlation between myocardial blush grades of the left coronary system with left ventricular dimensions and systolic function

<b>Parameters</b> \ <b>MBG</b>	<b>MBG</b>	<b>P</b>
Ejection fraction (%)	0.51	<0.001
End diastolic dimensions	- 0.63	<0.001
End systolic dimensions	- 0.57	<0.001

Myocardial blush grading had strong positive correlation with EF and fraction shortening, while it had strong negative

correlations with end systolic and end diastolic dimensions with statistically significant values (Table 12).

**Table (12):** Correlation between myocardial blush grades of the right coronary system with left ventricular dimensions and systolic function

<b>Parameters</b> \ <b>MBG</b>	<b>MBG</b>	<b>P</b>
Ejection fraction (%)	0.53	<0.001
End diastolic dimensions	- 0.48	<0.001
End systolic dimensions	- 0.5	<0.001

There was no significant correlation between myocardial blush grading of the

left coronary system and left ventricular diastolic function (P= 0.12-Table 13).

**Table (13):** Comparison between myocardial blush grading of the left coronary system and left ventricular diastolic function .

MBG \ DF	Grade I (n=8)	Grade II (n=17)	Grade III (n=25)
Grade I (n=33)	4	11	18
Grade II (n=13)	2	5	6
Grade III (n=4)	2	1	1
P value: 0.399			

There was a statistically significant correlation ( $P = <0.001$ ) between myocardial blush grading of the left coronary system and left ventricular

systolic function. The more impaired systolic function the more was the impaired myocardial blushing (Table 14).

**Table (14):** Comparison between degree of ejection fraction and myocardial blush grade of left coronary system

MBG \ EF degree	Grade I (n=8)	Grade II (n=17)	Grade III (n=25)
Normal (n=27)	1	5	21
Mild impairment (n=12)	1	10	1
Moderate impairment (n=5)	3	2	0
Severe impairment (n=7)	3	0	3
P value: <0.001			

There was no significant correlation between myocardial blush grading of the

right coronary system and left ventricular diastolic function ( $P = 0.22$  - Table 15).

**Table (15):** Comparison between myocardial blush grading of the right coronary system and left ventricular diastolic function (DF) and MBG .

DF	Grade I (n=5)	Grade II (n=14)	Grade III (n=31)
Grade I (n=33)	4	9	20
Grade II (n=13)	0	3	10
Grade III (n=4)	1	2	1
P value: 0.22			



There was a statistically significant correlation (P= 0.006) between myocardial blush grading of the right coronary system and left ventricular

systolic function. the more impaired systolic function the more was the impaired myocardial blushing (Table 16).

Table (16): Comparison between degree of ejection fraction (EF) and MBG .

EF degree	MBG		
	Grade I (n=5)	Grade II (n=14)	Grade III (n=31)
Normal (n=27)	1	3	23
Mild impairment (n=12)	2	6	4
Moderate impairment (n=5)	1	2	2
Severe impairment (n=6)	1	3	2
P value: <0.034			

### DISCUSSION

The MBG score is an angiographic method for the assessment of reperfusion during catheterization, based on the kinetics of dye penetration within the myocardium (Wieringa et al., 2014).

The present study was designed to emphasize the correlation between left ventricular functions and angiographic evidence of myocardial blush grade in patients with ischemic heart disease.

The mean age of studied cases was 56.5±8.1 years. Most of our cases were males (68%) and the most frequent risk factor was hypertension (54%). Mean systolic and diastolic blood pressure were 126.4 and 78.6 respectively. Those results were somewhat similar to Karahan et al. (2015) who found that the mean age was 57.5 ± 11 years and most cases were males (82.6%), smoking was the most frequent risk factor (43.1%) and hypertension represented 23.9%. This reflects about the risk factors of coronary artery disease which confirm that it increases

over age 45 years in men and over age 55 years in women. Dyslipidemia, high blood pressure, cigarette smoking and diabetes mellitus are other known risk factors (Zengin et al., 2015).

Ejection fraction was within normal limits in most of our cases (54%). Mild, moderate and severe impairment were found to be 24, 10 and 12 % respectively. Those results were similar to Tabor et al. (2015).

Regarding diastolic dysfunction (DD), 64% of patients had grade I dysfunction, and grade III was present in 8% of patients. Moreover, degree of dysfunction was not related to age, gender, heart rate or blood pressure. Sipic et al. (2013) reported similar results among patients with IHD. Grade I DD was reported in 64.2%, grade III in 4.6%, and it was not related to any of the studied risk factors. The coronary heart disease is one of the most important causes of diastolic dysfunction and almost all coronary patients have a certain degree of diastolic

dysfunction, regardless of concomitant systolic dysfunction (**Jamiel et al., 2016**).

In the present work, MBG of our cases was reported. It was for left system (grade I= 8 cases, grade II=17 cases and grade III= 25 cases); and for the right system (grade I= 5 cases, grade II= 14 cases and grade III= 31 cases). Moreover, MBG was directly correlated with TIMI of all arteries.

Thus, the assessment of microvascular perfusion and integrity was integral for risk stratification in patients with IHD. In this regard, prior studies have demonstrated the prognostic utility of MBG in this setting (**Stone et al., 2012**)

MBG may be practical when assessing microvascular function in the catheter laboratory especially at the time of PCI (**Porto et al., 2010**). Previous results showed that myocardial blush grade (MBG) 0 and 1 were associated with increased end-diastolic and end-systolic volumes at follow-up (**Niccoli et al., 2011 and Wong et al., 2012**).

Similar to our results, a study confirmed a correlation between MBG and left ventricular systolic function (**Karahan et al., 2015**).

However, there was a lack of studies which included heterogeneous population with IHD before coronary intervention. Thus, according to our knowledge, we were unique in the assessment of MBG in different patients with IHD.

In the present study, there was a strong correlation between MBG of both left and RT coronary systems with left ventricular function with highly statistically significant values. Similarly, there was a significant correlation between LV function recovery and MBG. MBG was univariate predictor of LV function recovery. The myocardial blush grade

(MBG) was the most powerful predictor of LV function recovery, MBG >2 and ST-segment elevation index reduction had good accuracy and MBG >2 had the best negative likelihood ratio (**AboulEnin et al., 2015**).

There was a statistically significant correlation between MBG and degree of right coronary stenosis. Also, there was a statistically significant correlation between MBG and LAD, while there was no statistically significant correlation with LCX. Those results were a little bit different from **Brener et al. (2013)** who reported that MBG was correlated with RCA and LAD. In the present work, degree of ejection fraction was statistically significant correlated with TIMI of LAD, while there was no statistically significant correlation with TIMI of LCX and RCA.

In a study, patients with TIMI grade 2-3 post PCI had significantly lower EDV, higher LVEF and better regional wall thickening in the infarcted region, and those patients also had significantly smaller infarct sizes (**Bethke et al., 2015**). However, there are lacks of data as regard relation between ventricular function and TIMI in ischemic patients.

## CONCLUSION

Myocardial blush grade was correlated with left ventricular systolic function, but not related to grades of diastolic dysfunction. Impaired myocardial blush grade was related to TIMI. Finally, impaired MBG of left system was associated with old age, male sex and low blood pressure.

## RECOMMENDATIONS

Further large wide scale studies to confirm the efficacy of myocardial blush grade as well as its relation to coronary intervention.

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## العلاقة بين وظيفة البطين الأيسر ودرجة إرتشاح الصبغة في عضلة القلب في المرضى الذين يعانون من مرض قصور الشرايين التاجية

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قسمي القلب والأوعية الدموية والباثولوجيا الإكلينيكية\* - كلية طب الأزهر

**خلفية البحث:** يعد مرض قصور الشرايين التاجية من أبرز المشكلات الصحية في معظم دول العالم حيث يتسبب في حالات مرضية خطيرة وزيادة في حالات الوفيات، ويعتبر قياس درجة إرتشاح الصبغة في عضلة القلب وسيلة واعدة لتقييم وظيفة البطين الأيسر، كما أنه يساهم في اختيار العلاج المناسب

**الهدف من البحث:** التأكيد على العلاقة بين وظائف البطين الأيسر ودرجة إرتشاح الصبغة في عضلة القلب بالتصوير الوعائي في المرضى الذين يعانون من نقص التروية القلبية .

**المرضي وطرق البحث :** إشمتمت الدراسة الحالية علي خمسين مريضا يعانون من الذبحة الصدرية، والذين تقرر عمل قسطرة تشخيصية علي الشرايين التاجية لهم. وجميع المرضى من المترددين علي قسم أمراض القلب بمستشفى جامعة الأزهر بدمياط الجديدة أثناء الفترة من شهر فبراير ٢٠١٥ وحتى شهر أكتوبر ٢٠١٥ ، حيث خضع كل مريض إلي أخذ التاريخ المرضي ، و فحص إكلينيكي كامل ، والفحوصات المعملية اللازمة. وتم تقييم وظيفة القلب الإنقباضية والإنبساطية عن طريق عمل أشعة تليفزيونية وموجات فوق صوتيه علي القلب ، ثم أخيرا تم إجراء قسطرة تشخيصية علي الشرايين التاجية مع قياس درجة إرتشاح الصبغة في عضلة القلب أيضا لتحديد الشرايين المسدودة ودرجة الإنسداد.

**النتائج:** متوسط أعمار الحالات التي إشمتمت عليها الدراسة هو ٥٦,٥ ، ومعظم تلك الحالات من الذكور بنسبة ٦٨ % ، كما كان أكثر عوامل الخطر شيوعا هو إرتفاع ضغط الدم بنسبة ٥٤ %، كما كانت نسبة ضخ الدم من البطين في حدودها الطبيعية في معظم الحالات بنسبة ٥٤ % ، كما كانت نسب القصور البسيط و المتوسط والشديد علي التوالي ٢٤ %، ١٠ %، ١٢ %.

وقد وجد بالنسبة لتقييم معدل سريان الدم بالشرايين التاجية أن معظم الحالات قد حصلوا علي مقياس ثلاثة علي مستوي الشرايين التاجية الثلاثة ، حيث كان عدد المرضى الحاصلين علي مقياس

ثلاثة بالنسبة للشريان التاجي الأيمن سبعة وأربعون مريضا من أصل خمسين ، وأربعة وأربعون مريضا بالنسبة للشريان الأيسر الامامي النازل ، وثلاثة وأربعون مريضا بالنسبة للشريان الأيسر المحوري .

وقد تم تقييم درجة إرتشاح الصبغة في عضلة القلب لكل من الشرايين التاجية اليمنى واليسرى حيث وجد أن أكثر النتائج شيوعا كانت مقياس ثلاثة لكل من الشرايين اليسرى بنسبة ٥٠% و للشرايين اليمنى بنسبة ٦٢% ، بينما كانت أقل الدرجات هي مقياس واحد بنسبة ١٦% للشرايين اليسرى ١٠% للشرايين اليمنى.

كما إرتبط قصور إرتشاح الصبغة في عضلة القلب في الشرايين التاجية اليسرى بـ كبر سن المريض و جنسه (أكثر الحالات وجدت لدى الذكور) ، وإنخفاض ضغط الدم . بينما لم يرتبط الشريان التاجي الأيمن بمثل هذه العوامل.

وقد كان قصور إرتشاح الصبغة في عضلة القلب في كل من الشرايين التاجية اليمنى واليسرى مرتبطا بقصور الوظيفة الإنقباضية في البطين الأيسر ، بينما لم يكن له أي إرتباط بالوظيفة الإنبساطية.

كما إرتبطت درجة القصور في إرتشاح الصبغة في عضلة القلب أيضا بتقييم معدل سريان الدم بالشرايين التاجية في كل من الشرايين التاجية اليمنى واليسرى. و في المقابل لم تكن هناك علاقة بين درجة الوظيفة الإنقباضية التي تم قياسها بإستخدام الأشعة التليفزيونية علي القلب وبين معدل سريان الدم بالشرايين التاجية في الشريان التاجي الأيمن ولا بمقياس معدل سريان الدم بالشرايين التاجية في الشريان الأيسر المنحني. وأخيرا ، فقد إرتبط القصور في إرتشاح الصبغة في عضلة القلب بدرجة الإنسداد في كل الشرايين التاجية ما عدا الشريان الأيسر المنحني.

#### الإستنتاج :

- هناك إرتباط بين درجة القصور في إرتشاح الصبغة في عضلة القلب بالوظيفة الإنقباضية للشريان التاجي الأيسر ، ولكنها غير مرتبطة بالوظيفة الإنبساطية له.
- درجة القصور في إرتشاح الصبغة في عضلة القلب مرتبط أيضا بمقياس معدل سريان الدم بالشرايين التاجية ودرجة إنسداد الشريان.

وأخيرا؛ فإن القصور في درجة إرتشاح الصبغة في عضلة القلب في الشريان التاجي الأيسر كان مرتبطا بـ كبر سن المريض ، و جنس المريض ( أكثرهم من الذكور) ، وأيضا إنخفاض ضغط الدم.