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The Value of Non-Alcoholic Fatty Liver Diseases Detected by Fibroscan in the Prediction of Coronary Heart Diseases Detected by Multi-Slice CT Angiography

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Abstract

Background: Non-alcoholic hepatic steatosis, considered to be the hepatic manifestation of Metabolic Syndrome (MS), is the commonest liver disease in industrialized countries and it is associated with increased incidence for Coronary Artery Disease (CAD).

A high percentage of hepatic steatosis was detected in patients who examined by invasive coronary angiography with increased incidence of relevant coronary artery disease in patients with fatty liverin comparison to those who did not have signs of lipid accumulation in liver on ultrasound.

Aim of Study: This study aims to assess the frequency of non-alcoholic fatty liver diseases in coronary heart disease patients by using a new diagnostic tool: TE (Fibroscan) and coronary CT angiography.

Patient and Methods: A total number of 60 patients suffered from Non-Alcoholic Fatty Liver Disease (NAFLD) to be examined by fibroscan examination with CAP parameter and then computed tomography coronaries angiography by using agaston score.

Results: The age of the patients ranged from (32-72) years with mean age of 52 years, 34 male patients (56.7%) and 26 female patients (43.3%), in this study there were 28 patients suffered from hypertension, 28 patients suffered from DM, 20 patients were smokers, 18 patients were obese and 6 patients had no risk factors with overlap of the risk factors. In this study there were 18 patients did not suffer from coronary stenosis, 10 patients suffered from minimal stenosis, 6 patients suffered from mild stenosis, 16 patients suffered from moderate stenosis and 10 patients suffered from severe stenosis according to Agaston score. According to CAP parameter in this study there were 12 patients suffered from mild steatosis, 16 patients suffered from moderate steatosis, 28 patients suffered from severe steatosis and 4 patients did not suffered from steatosis.

Conclusions: The fibroscan is the best non-invasive technique in diagnosis of the hepatic steatosis. The multi-detector CT coronary angiography is a good method in diagnosis of the coronaries diseases and stenosis provide excellent diagnostic results. Nonalcoholic hepatic steatosis that determined by fibroscan, is strongly correlated with coronary artery atherosclerosis therefore, be a relevant predictor of coronary-diseases.

Key Words: *Coronary artery disease (CAD) – Fatty liver diseases – Slice CT angiography.*

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Introduction

NON-ALCOHOLIC fatty liver disease (NAFLD) is the commonest chronic liver disorder in many countries **[1]**. It ranges from simple fatty liver to nonalcoholic steato-hepatitis, fatty liver with hepatitis and hepatic injury with or without fibrosis, advanced fibrosis, and cirrhosis **[2]**. It was discovered that the liver is very important in the regulation of metabolism for more than one century and a half, but fatty liver has been considered a trivial finding for long duration **[3]**. The new studies have shown that NAFLD aren't a sign for CVD **[4]**, but it might be involved in its pathology **[5]**. Many people suffered from NAFLD presented with no symptoms **[6]**, and the disease is often discovered accidently **[7]**.

The best method in confirming the diagnosis of NAFLD is the liver biobsy, but it is an invasive method which can cause major complications and is susceptible to significant sampling error **[8]**. Liver biopsy repetition to discover changes in fatty liver is difficult **[9]**. Recently, some noninvasive methods werestrongly used in the diagnosis of fatty liver, like CT and proton MRS. But, using these methods is restricted due to its high cost, difficult availability. Also, these techniques cannot simultaneously assess liver fibrosis and fatty liver. To overcome these problems, a new technology called transient elastography (Fibroscan) has been developed from few years **[10]**. It has shown excel-

lent results in the diagnosis of liver fibrosis. In addition to that, a new noninvasive parameter, called the controlled attenuation parameter, has been discovered to detect and quantify fatty liver using the Fibroscan. Controlled attenuation parameters being introduced on TE, both fatty liver and fibrosis can be assessed simultaneously, and this enlarged the range of noninvasive techniques for the diagnosis and treatment of chronic liver diseases. It is fast, painless, easy to use, and cheaper than liver biopsy [11].

CAD is the commonest cause of mortality in many countries [12]. In recent time the coronary angiography is exchanged by a new noninvasive method, the coronary CT angiography [13], which has win in the last years with the rapid development of imaging technology, leading to more accurate coronary artery diseases diagnosis [14].

The development of 64 detectors multi slice CT scans added a revolution in the heart imaging, increasing the specificity and sensitivity of this technique for the management of the coronary atherosclerosis up to the values of 99% respectively [15].

Patients and Methods

A total number of 60 patients suffered of NAFLD 34 males and 26 females. With age ranging from 32 years to 72 years with mean of 52 years were referred from hospitals to Radiology Department to be assessed by fibroscan examination with CAP parameter and then computed tomography coronaries angiography. The time of the prospective study was from June 2017 to September 2018.

All patients were examined clinically by measuring the weight and the height of the patients to calculate the BMI and monitoring the vital sign such as blood pressure and heart rate measurement to act as baseline to control the heart rate during examination.

Laboratory investigation like renal function tests to make sure that the patient is fit for injection of contrast material. The examination is contraindicated if the serum creatinine was above 1.8mg/dl.

Inclusion criteria:

- Non-alcoholic fatty liver diseases.
- Dyspnea on exertion.
- Fatigue on mild effort.

Exclusion criteria:

- Pregnant women.
- Irregular heart rate.
- Allergy to contrast media.
- Renal insufficiency (creatinine level ≥1.5mg/dL).
- Inability to sustain a breath hold for 8 seconds.
- Morbid obesity.
- Patient with bad general condition needing life support.
- Liver failure and cirrhosis.
- Alcohol abuse.

1- *Radiological examination:*

A- Fibroscan:

- Technique:

A- *Patients' preparation:*

- Fasting for 10 hours before the scan.
- Take all regular medication.

B- Patient position: Patient was asked to lie supine in maximum right arm abduction for easy access to the right lobe of the liver and during the examination the patient was asked to take full inspiration and hold his breath.

C- Procedure: FibroScan uses an external actuator to produce frequency vibration with frequencies ranged from 50-500Hz.

FibroScan uses an ultrasound M probe (5MHz) with a dedicated vibrating system which generates a mechanical waves with a low amplitude and frequency (50MHz) the introduction of XL probe allows more accurate study of liver in the patients with skin-to-liver capsule distance more than 2.5cm, while limitation of XL probe is a skin-to-liver capsule distance more than 3.5cm that correspond to BMI more than 40. The mechanical impulse produces shear waves in the liver that come return to the transducer at the end of the probe, that functions as a generator and a receiver.

The probe was contacted to the skin of 9 th to 11 th intercostal space with coupling gel then we pressed the probe button to start the measurement.

B- *Coronary CT angiography:*

All patients were examined by multislice CT coronary angiography.The examination was done after explanation of the procedure to the patient and ensuring that there was no contraindication to the study.

Patients' preparation:

A- *Instructions to the patients:*

1- Fasting for 10 hours before the scan.

2- No caffeine or smoking 12 hours before examination.

3- Encourage water intake.

4- Avoid smoking at the day of examination.

5- Take all regular medication.

6- Take pre medication for contrast allergy as needed.

7- Take pre medication for renal protection as needed.

8- Stop metformin 48 hours after the scan.

B- Heart rate control:

Blood pressure and heart rate were measured on patients arrival to set monitoring baseline.

If the heart rate less than 65 beat per minute were not given any medication for control the heart rate.

If the heart rate from 65 to 75 beat per minute were given 50mg oral metoprolol before the scan with an hour, if the heart rate more than 75 beat per minute were given 100mg metoprolol oral before the scan with an hour. Patients who contraindicated to B blockers like bronchial asthma patients were given ivabradin (5mg oral) before the scan with an hour.

Heart rate and blood pressure were measured every 30 minutes till we reach the desired heart rate.

C- Setting up intravenous access:

Cannula (18G) was inserted iv after control of heart rate. For all patients we used the right antecubital vein to achieve high flow rate of injection and shorter way for contrast bolus to reach the heart.

Patient position:

- Patients were asked to lie supine with arms raised above their heads for the duration of the examination. This will help improve image quality.
- The patient must be lie in position in which the heart located in the gantry's center.
- ECG electrodes were conducted to the chest after preparation of the skin with alcohol.
- We connected the IV line and test injection was done with saline to make sure of good IV access without extravasation.
- The table moved quickly through the scanner to determine the correct starting position for the scan. Then the table moved slowly through the machine as the actual CT scanning was performed.
- Patient was asked to hold his breath during the scanning. Any motion, whether breathing or body movement, can lead to artifact on the images.
- The patient must inform the doctor if he has problems in holding his breath for 5 to 15 seconds.

Injection of contrast media:

- Non-ionic contrast media (ultravist) had been injected via IV line by a dual-head automatic injector followed by 50cc of saline for flushing.
- Contrast media volume (in millilitre) = (Scan time % 10) X the rate of injection flow.
- The rate of injection flow was adapted regarding to Kv used.

Protocol of CT scan:

All patients were examined with 320 row multi-detector CT scanner (Aquilion One, Toshiba Medical Systems, Otawa, Japan) at Tanta University Hospital.

The first step in a CCTA examination was an AP scout topo-gram which help prescribing the scanned field of view. The upper border of the field of view was under the carina. The lower border of the field of view must be below the diaphragm to include the cardiac apex.

The second step in a CCTA was the non-contrasted scan for calcium scoring. Patients with calcium score more than 800 were excluded.

Image acquisition:

Semi-automated determination of the starting time using the “Bolus tracking technique” was used in all patients. It includes injection of the total volume of the used contrast media as a one bolus at the pre-determined rate. After a ten seconds delay from the start of injection (time for the contrast to reach the pulmonary great vessels, being variable regarding to the cannula's site, rate of injection, body built and heart rate).

At the end; the volume data set for the visualization of coronary artery is acquiredin a spiral mode. During the scan; the ECG datahad been recorded digitally. Patients were instructed to hold an inspiratory breath during the CT data and the ECG trace were acquired.

The parameters of the acquisition was 0.35 second of time of gantry rotation, the milli-amber and kv varied regarding to the body measurement of the patient.

Image reconstruction:

A slice thickness of 0.5mm reconstructions was used. The reconstruction of images at the workstation is a time-consuming process, aimed to select the most suitable set of images forvisualization of coronary artery with avoiding the reconstructions with artifacts due to cardiac motion.

Generally, the suitable phase of the cardiac cycle in which all the coronary arteries are best visualized is; the best diastole phase (usually range is 70-80% of the R-R interval of the cardiac cycle); in case of heart rate less than 75b/m while; it is the best systole phase (usually range is 40-50% of the R-R interval) in case of heart rate more than 75b/m.

Three dimensional volume rendering reconstruction:

This 3D reconstruction gives a "vascular image", that consists of the amount of contrast media filling the lumen of the vessel, so that, quick visualization of the distribution of the coronary arterial tree, where it is easy to identify the presence of normal variants, abnormal origin and course of the vessels, or intra-myocardial bridges. The presence of a non-calcified atherosclerotic plaque, featured by a decrease in the luminal density is detected, however 3D images are not the preferred technique for the detection of the lesion severity. Finally, other highly dense structures that may lie beside to coronary arteries, are recognized on 3D reconstructions.

Multiplanar reconstruction (MPR):

The technique by MDCT consists of getting sections of the vessels on multiple orientations by means of MPR techniques, not confined to the axial plane. By means of different modalities of MPR, better view of both the wall and the lumen of the vessel is possible, facilitatingthe analysis of the vessels.

Post processing:

The reconstructed axial views at different parts of the cardiac cycles are sent to the workstation (VitreaFx, Vital Images, USA). For analysis of the coronary arteries, it is important to keep the reconstructed slice thickness for the coronary axial slices as thin as possible.

Image analysis:

The coronary arteries were examined to determine areas of significant stenosis or occlusion which may lead to recurrent symptoms. The measurement of the lumen had been done through looking at 3.0 MIP images and the curved planar reformatted images.

Results

This study had been done on a number of 60 patients, 34 males and 26 females. With age ranging from 32 years to 72 years with mean of 52 years. All patients were examined by multi-detector CT coronary angiography and liver fibroscan in the Radiology Department of Tanta University. In this study the commonest age group was from 51 to 60 years (20 patients) and the least common group was more than 70 years.

In this study the males patients were 34 patients and the female patients were 26 patients. In this study there were 28 patients suffered from hypertension, 28 patients suffered from DM, 20 patients were smokers, 18 patients were obese and 6 patients had no risk factors with overlap of the risk factors.

Age and degree of steatosis were significantly correlated ($p<0.01$), also there was significant correlation between gender and fatty liver as severe steatosis appeared more in males (Table 1).

Table (1): Relation between degree of coronary stenosis and demographic data (n=60).

	Degree of coronary stenosis										Test of sig.	*p*
	No (n=18)		Minimal (n=10)		Mild (n=6)		Moderate (n=16)		Severe (n=10)			
	No.	%	No.	%	No.	%	No.	%	No.	%		
Sex:												
Male	8	44.4	6	60.0	2	33.3	12	75.0	6	60.0	χ^2=	MC*p*=
Female	10	55.6	4	40.0	4	66.7	4	25.0	4	40.0	4.681	0.330
Age (years):												
Min.-max.	32.0-62.0		38.0-65.0		60.0-62.0		38.0-72.0		55.0-66.0		F=	<0.001*
Mean ± SD	47.22±8.33		53.0± 10.89		61.33± 1.03		56.0±9.09		62.40±4.35		7.193*	
Median	47.0		54.0		62.0		56.0		64.0			

The age and the degree of coronary stenosis were significantly correlated (p=.001), the severity of coronary disease increased with the age. There was no significant correlation between sex and severity of coronary disease (p>.05).

Calcium score is important in evaluation of coronary vessels stenosis, so patients were classified into five groups according Agaston score to five groups regarding to their calcium score

- *Group (1):* If the calcium score is zero so, no evidence of coronary stenosis that included 18 patients.
- *Group (2):* If the calcium score is from 1 to 10 so, there is minimal coronary stenosis which included 10 patients.
- *Group (3):* If the calcium score is from 11 to 100 so, there is mild coronary stenosis which included 6 patients.
- *Group (4):* If the calcium score is from 101 to 400 so, there is moderate coronary stenosis which included 16 patients.
- *Group (5):* If the calcium score is more than 400 so, there is severe coronary stenosis which included 10 patients.

In our study the number of patients that suffer from LAD stenosis was 34 patients, the patients that suffer from LM stenosis was 10 patients and the patients that suffer from RCA stenosis was 14 patients with overlap of the stenosis between cases.

In this study there were 12 patients suffered from mild steatosis, 16 patients suffered from moderate steatosis, 20 eight patients suffered from severe steatosis and 4 patients did not suffer from steatosis according to CAP parameter (Table 2).

Age and degree of steatosiswere significantly correlated (p<0.01), also gender and fatty liverwere significantly correlated as severe steatosis appeared more in males.

Degree of coronary disease and degree of steatosiswere significantly correlated (p<0.01), the severity of coronary diseases increased with the severity of steatosis in the moderate and severe steatosis the degree of coronary stenosis increased (Table 3).

Degree of steatosis and the degree of coronary stenosis were significantly correlated. The severity of steatosis increased with the severity of coronary stenosis.

Table (2): Relation between Fibroscan result and demographic data (n=60).

	Degree of steatosis								Test of sig.	MC_p
	No (n=4)		Mild (n=12)		Moderate (n=16)		Severe (n=28)			
	No.	%	No.	%	No.	%	No.	%		
Sex:										
Male	2	50.0	2	16.7	12	75.0	18	64.3	χ^2=	MCp=
Female	2	50.0	10	83.3	4	25.0	10	35.7	10.633*	0.008*
Age (years):										
Min.-max.	32.0-55.0		38.0-63.0		39.0-64.0		3 8.0-72.0		F=	0.009*
Mean ± SD	43.50±13.28		50.33±9.55		54.13±8.75		58.0±8.30		4.265 *	
Median	43.50		47.0		57.50		58.0			

Table (3): Relation between Fibroscan result and degree of coronary stenosis (n=60).

Degree of coronary stenosis	Degree of steatosis								χ^2	MC_p
	No (n=4)		Mild (n=12)		Moderate (n=16)		Severe (n=28)			
	No.	%	No.	%	No.	%	No.	%		
No	4	100.0	6	50.0	6	37.5	2	7.1	35.989*	<0.001 *
Minimal	0	0.0	6	50.0	0	0.0	4	14.3		
Mild	0	0.0	0	0.0	4	25.0	2	7.1		
Moderate	0	0.0	0	0.0	4	25.0	12	42.9		
Severe	0	0.0	0	0.0	2	12.5	8	28.6		

Cases:

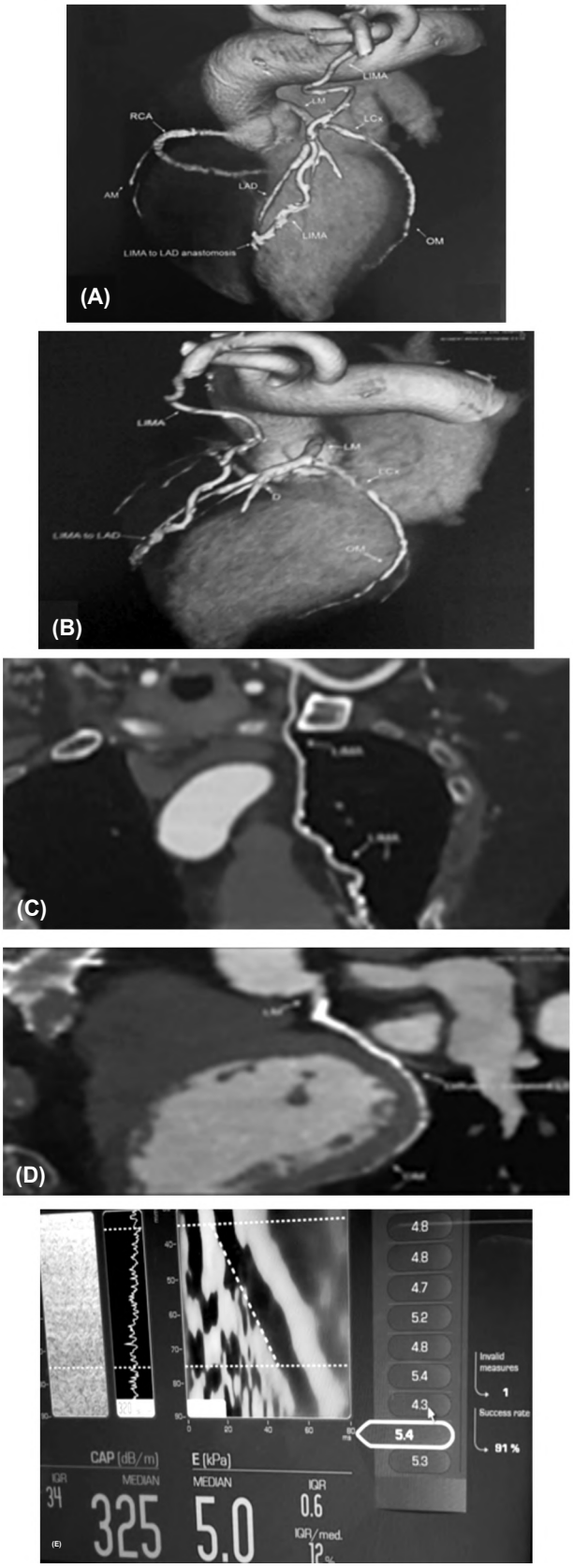

Fig. (1): Male patient aged 66 years, (A, B, C, and D) Showing CT coronary angiography showing three vessels stenosis and (E) Showing severe steatosis by fibroscan.

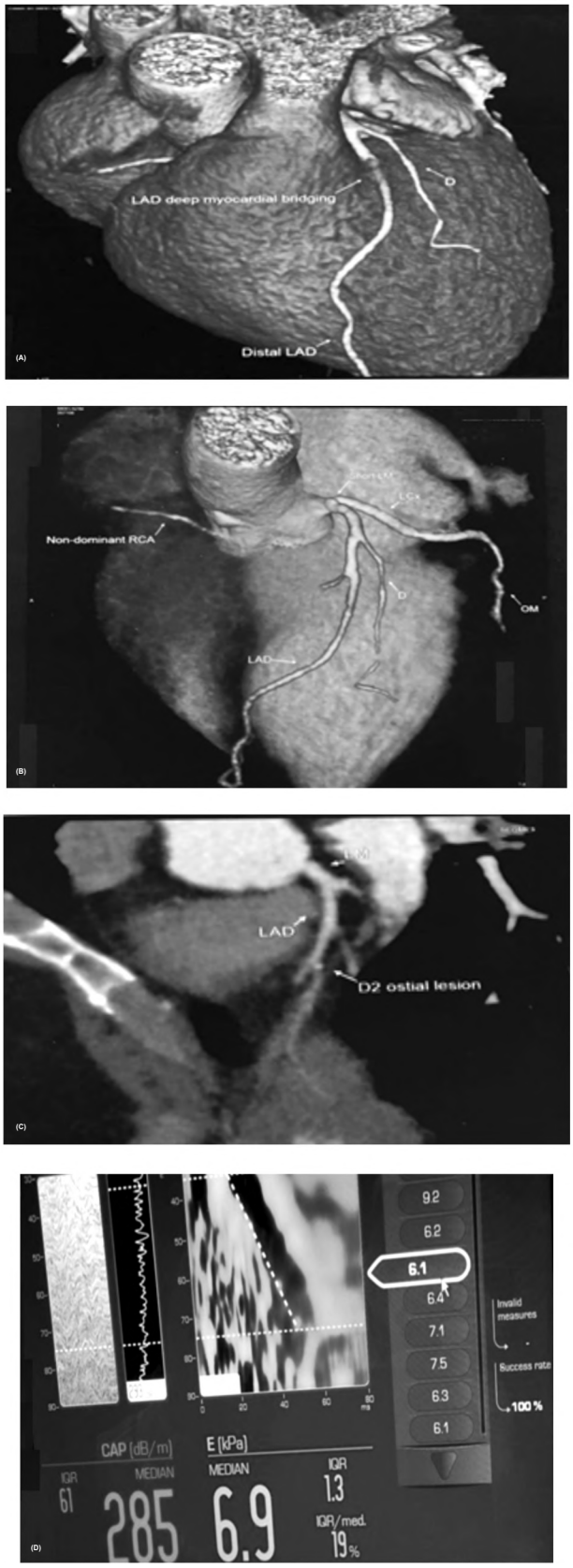

Fig. (2): Female patient aged 62 years (A, B and C) Showing CT coronary angiography mild LAD stenosis and (D) Showing moderate steatosis with fibroscan.

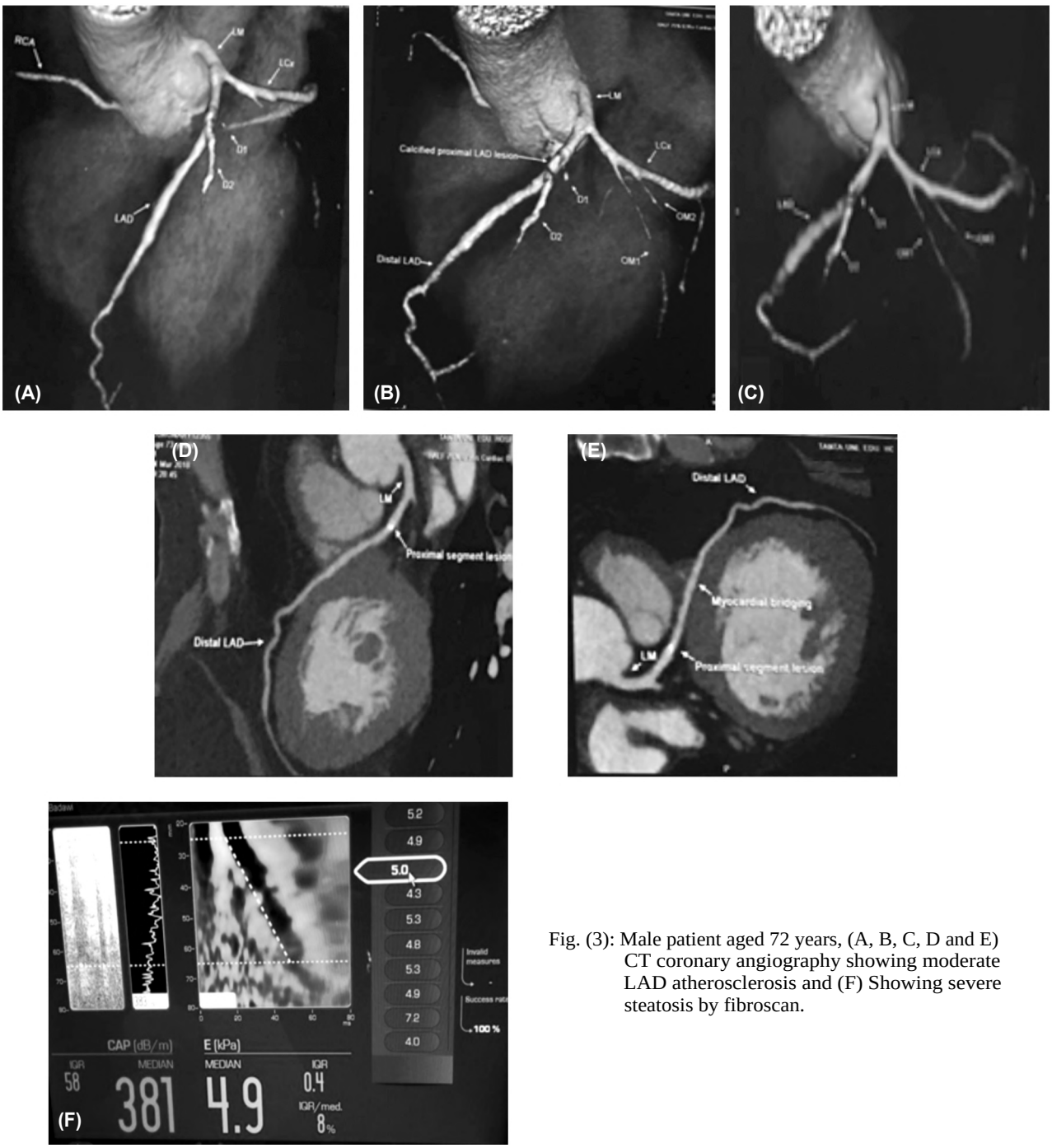

Fig. (3): Male patient aged 72 years, (A, B, C, D and E) CT coronary angiography showing moderate LAD atherosclerosis and (F) Showing severe steatosis by fibroscan.

Discussion

Non-alcoholic hepatic steatosis, considered to be the hepatic manifestation of Metabolic Syndrome (MS), is the commonest liver disease in industrialized countries and it is associated with increased risk for coronary artery disorders **[16,17]**.

A high incidence of hepatic steatosis was detected in patients who examined by invasive coronary angiography with increased incidence of relevant CAD in steatoticpatients compared to other patients who did not suffered from signs of hepatic lipid accumulation on ultrasound **[18]**.

NAFLD is defined as accumulation of lipid in 5% of hepatocytes **[19]**. In fibroscan, steatosis could be detected if more than 30% of hepatocytes are affected by accumulation of lipid with a sensitivity and specificity of more than 80% **[20]**.

A new ultrasound based technique which named Controlled Attenuation Parameter (CAP), Thatintegrated in the FibroScanmachine, allows measure-

ment of steatosis if 10% of hepatocytes are affected and the studies reported diagnostic accuracy of 80±90% [21].

NAFLD is a risk factor for the progress of Non-Alcoholic Steatohepatitis (NASH).

NASH is featured by fibrotic remodeling of the steatotichepatic parenchyma [19].

Patients affected with NASH are at high risk to suffer from liver cirrhosis with all its complications such as Hepatocellular Carcinoma (HCC) andelevated liver-associated mortality in comparison to NAFLD [17].

Patients with NAFLD have anincreased risk for higher-grade coronary artery diseases than patients without fatty liver [22].

Multiple studies have shown that transient elastography (TE, FibroScan1, Echosens, Paris, France) diagnose hepatic steatosis with better diagnostic accuracy, so that allow the differentiation between NAFLD with advanced fibrosis and NAFLD if applied with CAP [23].

The mechanism explaining the link between NAFLD and CAD is not understood. NAFLD is associated with obesity, especially with visceral obesity, although, NAFLD has been shown to be presented with dyslipidemia, DM, and hypertension, regardless of the amount of visceral fat [24].

In the present study, the incidence of diabetic patients with nonalcoholic fatty liver was significantly higher than that in patients who did not suffer from nonalcoholic fatty liver. Nonalcoholic hepatic steatosis was reported to be a cause of diabetes mellitus, whereas DM itself is aimportant factor for high-risk coronary heart diseases [25].

The commonest age group in this study was from 51 years to 60 years and the range of age in all cases was from 32 to 72 years with the mean was 55 years.

The least common age group was above 71 years.

The age and the degree of coronary stenosiswere significantly correlated (p=.001), the severity of coronary disease increased with the age, while in (Osawa K, et al., 2015) and (Wong VW, et al.; 2011) also the age and the degree of coronary stenosiswere significantly correlated [25,26].

The probability of the coronary diseases increased with the age, due to increasing the incidence of risk factors like DM, HTN and atherosclerosis.

Age and degree of steatosiswere significantly correlated (p<0.01), the degree of steatosis increased with age.

In comparison to (Schoelzel F, et al., 2017) and (Osawa K, et al., 2015) age and degree of steatosiswere significantly correlated [25,27].

The degree of steatosis increased with age due to increasing the risk of obesity and atherosclerosis due to lack of exercise and decrease mobility.

In this study there were 34 males and 26 female and there was no significant correlation between sex of patients and the severity of coronary stenosis, but gender of patients and degree of steatosiswere significantly correlated, while in (Schoelzel F, et al., 2017) there was a significant correlation between the sex and the degree of steatosis and degree of coronary steatosis, this difference may be due to small number of cases and short period of the study [27].

This proved that the gender of the patients had no effect on our study.

In this study the most appeared risk factor was the hypertension in 28 patients, there were 20 patients suffered from DM, 18 patients suffered from obesity and only six patients with no risk factors.

Hypertension is a systolic blood pressure more than 140mmHg, diastolic blood pressure more than 90mmHg or receiving medical therapy for HTN [28].

DM isa fasting blood glucose more than 126mg/dl or receiving medical treatment for DM [29].

Hypertension is considered to be a major risk factor causing atherosclerosis, for example middle aged patients who suffering from high blood pressure are liable to coronary heart diseases five times more than patients with no high blood pressure [30].

Diabetes mellitus is also an important risk factor, as DM causes increasing the level of cholesterol in the blood and this will increase the liability to coronary heart diseases. The diabetic patients are more liable to coronary heart diseases 2-4 times more than patients without DM.

Obesity leads to increase the level of cholesterol and triglyceride in blood and this will increase the liability of coronary heart disease and atheroscle-

rosis, also the obesity will lead to increase the incidence of non-alcoholic steatosis **[28]**.

Smoking is a risk factor because it leads to increase the liability of atherosclerosis and coronary arteries diseases, smoker patients are more liable to atherosclerosis and coronary diseases 4 times more than non-smoker patients.

In this study the more the risk factors in the patient the more the severity of the coronary atherosclerosis, coronary stenosis and the severity of the hepatic steatosis and this agrees with (Schoelzel F et al., 2017) in which there was correlation between the risk factors and the severity of coronary atherosclerosis and degree of steatosis **[27]**.

According to the calcium score the patients were subdivided into 4 groups, minimal atherosclerosis if the range from 1 to 10 (ten patients), mild atherosclerosis if the range was from 11 to 100 (6 patients), moderate atherosclerosis if the range was from 101 to 400 (16 patients) and severe atherosclerosis if the calcium score was more than 400. The commonest group was the moderate atherosclerosis with sixteen patients in this group.

In this study the left coronary system was more liable to atherosclerosis than right coronary system and all the lesions was in the major branches as follow: The LAD lesion was in thirty four patients, the LM lesion was in ten patients and the RCA lesion was in fourteen patients. The commonest diseased branch was the left anterior division.

In comparison with the commonest affected branch was LAD and the most common risk factor was the hyper tension like our study **[25]**.

In comparison with the commonest affected branch was LAD and the most common risk factor was DM **[26]**.

In comparison with the commonest affected branch was also the LAD and the most common risk factor was hypertension **[27]**.

In our study there were four groups of hepatic steatosis, mild when the CAP score was from 221 to 260, moderate steatosis when the score was from 261 to 300, severe steatosis when the score was above 300 and no steatosis when the score was from 180 to 220.

The commonest group of steatosis in our study was the severe steatosis with twenty eight patients and the least common group of steatosis in our study was the mild steatosis with twelve patients.

In other studies like the commonest group of steatosis was the severe steatosis and the least common group was the moderate steatosis **[27]**.

In comparison with the commonest group of steatosis was the moderate steatosis and the least common group was the mild steatosis **[31]**.

In this study the hepatic steatosis and coronary atherosclerosis shared the most of the risk factors like hypertension, diabetes mellitus and obesity, this proved that there is a cross link between the steatosis and coronary atherosclerosis.

In our study the degree of the coronary artery atherosclerosis and the degree of steatosiswere significantly correlated (p=.001), like in the study of the severity of coronary disease and the degree of steatosiswere significantly correlated, in the degree of steatosis and the degree of coronary stenosiswere significantly correlated due to the large number of cases and long duration of the study, in and the degree of coronary stenosis and the severity of hepatic steatosiswere significantly correlated **[25,27,31,32]**.

This proved that the non-alcoholic fatty liver is a very important risk factor of coronary heart disease and atherosclerosis as in our study and in the degree of steatosis and the degree of coronary atherosclerosiswere significantly correlated, for that we can consider that the non-alcoholic fatty liver is an important risk factor for the coronary heart diseases and atherosclerosis **[25,27,31]**.

Limitation: Limitations were due to limited number of cases and short duration of our study, as in our study the number of cases were 60 case while in the number of cases was over six hundred cases and the duration of the study were over two years but there was similarity between our study and these studies like correlation between age and degree of steatosis and degree of coronary stenosis and the correlation between degree of coronary stenosis and degree of steatosis **[25,27,31]**.

Summary and Conclusion:

The fibroscan is the best non-invasive technique in diagnosis of the hepatic steatosis. The multi-detector CT coronary angiography is a good method in diagnosis of the coronaries diseases and stenosis provide excellent diagnostic results. Nonalcoholic hepatic steatosis that determined by fibroscan, is strongly correlated with coronary artery atherosclerosis therefore, be a relevant predictor of coronary-diseases.

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تقييم تأثير أمراض الكبد الدهنى الغير كحولى المشخص عن طريق الفيبروسكان (المسح الليفى) فى توقع أمراض الشرايين التاجية عن طريق الآشعة المقطعية متعددة المقاطع بالصبغة

مقدمة: يعتبر مرض الكبد الدهنى غير الكحولى هو مرض الكبد المزمن الأكثر شيوعاً، ويشمل مجموعة من الأسباب المرتبطة بترسب الدهون فى خلايا الكبد وهو يتراوح من الكبد الدهنى البسيط إلى إلتهاب الكبد الدهنى غير الكحولى. تم التعرف على أهمية الكبد فى تنظيم عملية التمثيل الغذائى، ولكن الكبد الدهنى قد أعتبر أن له دوره المحتمل فى تصلب الشرايين فى السنوات الأخيرة. وعلاوة على ذلك، أظهرت الدراسات الحديثة أن الكبد الدهنى ليس مجرد علامة على أمراض القلب والأوعية الدموية، ولكنها قد تكون فى الواقع سبب رئيسى لهذه الأمراض.

الهدف من الدراسة: تهدف هذه الدراسة إلى دراسة معدل أمراض الكبد الدهنية الغير كحولية فى مرضى الشرايين التاجية وذلك عن طريق إستخدام المسح الليفى للكبد والآشعة المقطعية بالصبغة على الشرايين التاجية.

المرضى وطرق البحث: تم تطبيق الدراسة على المرضى الذين يعانون من ضيق فى التنفس مع المجهود العنيف أو تعب مع المجهود العادى والذين يعانون من أمراض الكبد الدهنى وذلك فى وحدة الآشعة التصويرية بالصبغة فى قسم الآشعة بجامعة طنطا وتمت الدراسة على عدد ستين حالة.

النتائج: تثبت هذه الدراسة وجود علاقة قوية بين درجة الدهون فى الكبد ودرجة تصلب الشرايين التاجية مما نستنتج عنه أننا يمكن أن نعتبر أن الكبد الدهنى من عوامل خطورة الإصابة بأمراض الشرايين التاجية.

الإستنتاج: يعتبر الفيبروسكان أفضل طريقة لتشخيص الكبد الدهنى الغير كحولى كما تعتبر الآشعة المقطعية متعددة المقاطع بالصبغة أفضل طريقة لتشخيص أمراض الشرايين التاجية وهناك علاقة وطيدة بين أمراض الشرايين التاجية وبين أمراض الكبد الدهنى الغير كحولى.