RESULTS

***Retrospective study data:**

In this study the number of patients who had underwent Coronary angiography in Benha university hospital and in National Heart Institute from January 2000 to October 2002 was 8600 patients(5934 male and 2666 female) in which 279 patients (3.2%) had left main stem stenosis (Fig.3). Fifty seven patients (20.5%) of those who hav LMCA disease were below age of 50 years,121 (43.4%) patients were aged 50-60 years,101 (36.1%) patients were above 60 years (Fig4). Sixty two (22%) were females, and 217 (78%) patients were males . The incidence of LMCAD in female patients was 2.3% (62/2666) and in male patients was 3.7% (217/5934) (Fig. 5). Twenty eight patients (10%) had isolated left main lesion which represent 0.3% of total. According to the site of the lesion in the LMCA, seventy one patients (25.4%) had proximal, 80 patients (28.6%) had mid and 150 patients (53.6%) had distal LMCAD. In male distal LMCAD was more common than proximal (84% vs 66.2% $p< 0.05$)while in female proximal was more common than distal (33.8% vs 16% $p=0.02$) (Fig.6).

Most patients had at least one other significant lesion in the coronary tree beside the left main stem lesion, 147 patients (52.7%) had three vessels disease, 71 patients (25.4%) had two vessels disease and 33 (11.8%) had single vessel disease (Fig.7). The most common coronary artery affected beside LMCA was left anterior descending coronary artery (82%) then right coronary artery (74.9%) then left circumflex coronary artery (63.7%) (Table 1).

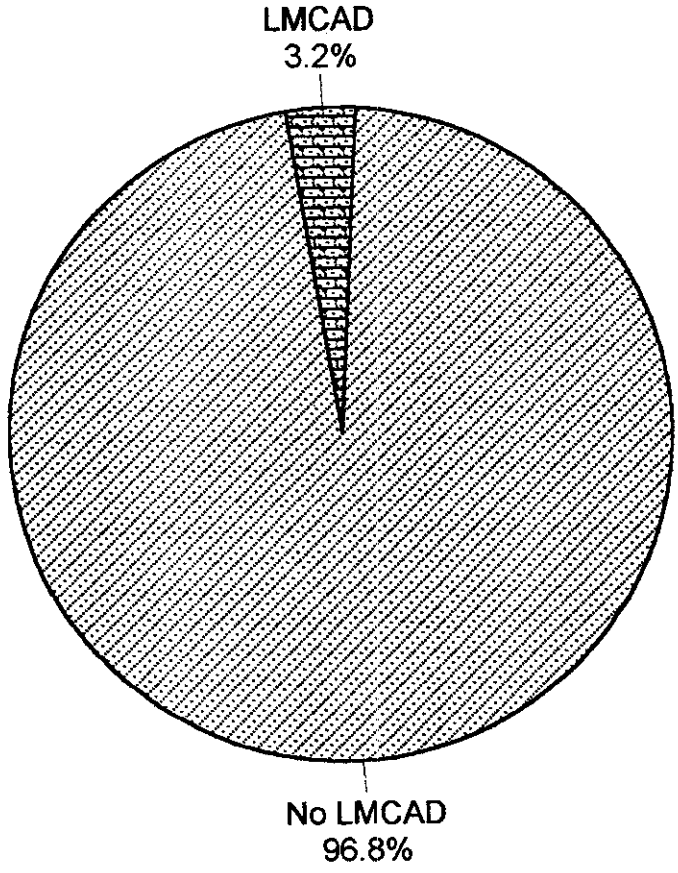

Fig. (3): Incidence of LMCAD among ischemic patients under study

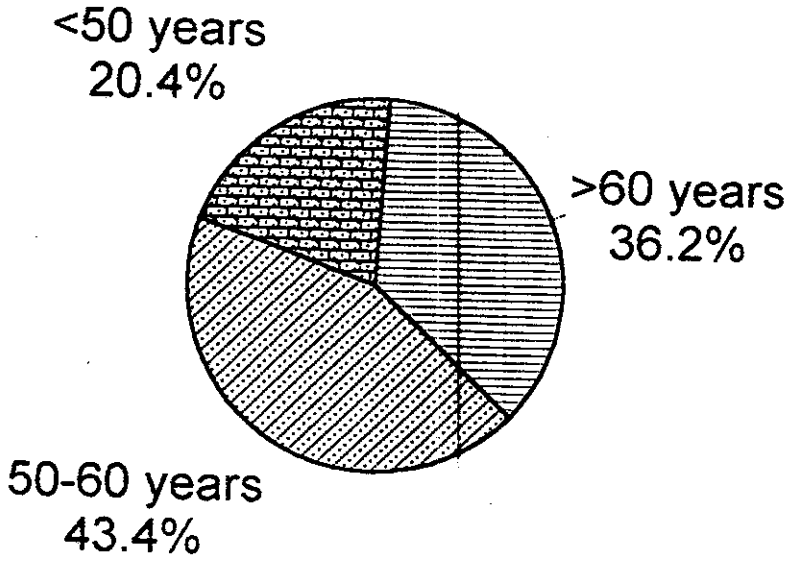

Fig. (4): Age groups among LMCAD patients

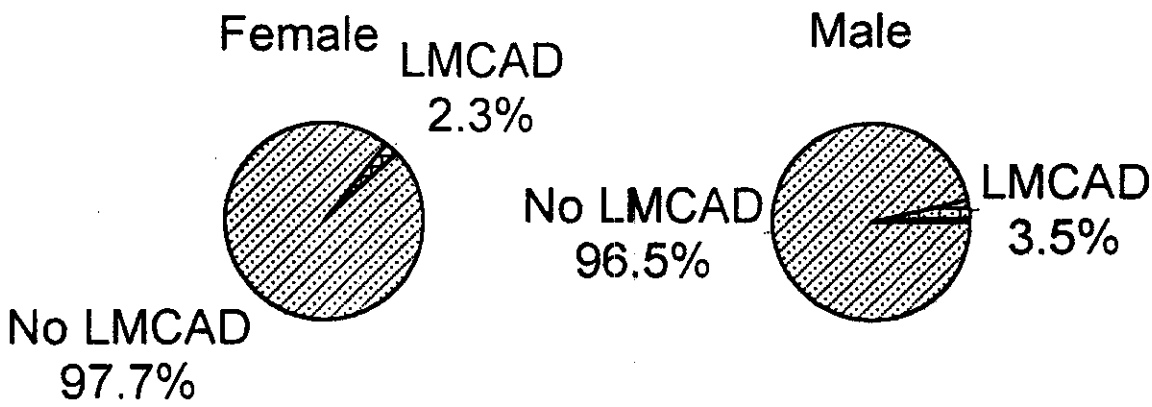

Fig. (5): Left main incidence according to sex

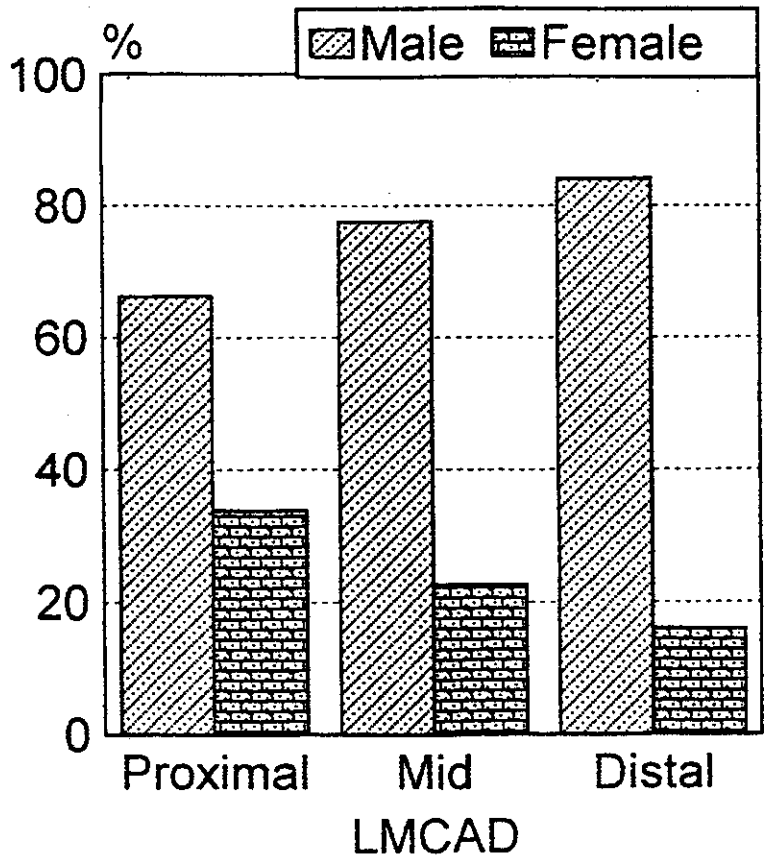

Fig. (6): Sex distribution among different LMCAD groups

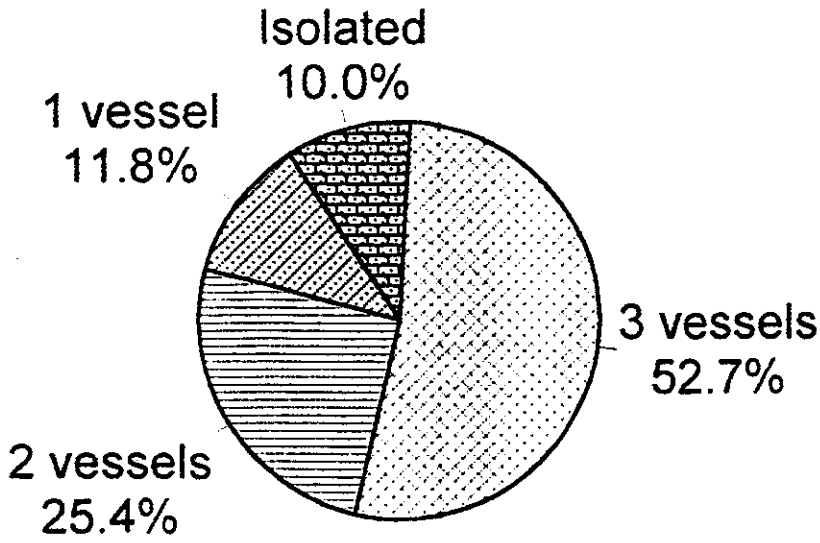

Fig. (7): Coronary arteries affected beside LMCA

***Table 1** : Incidence of coronary arteries affection beside LMCA.*

Coronary arteries	No.	(%)
LAD	229	(82%)
RCA	209	(74.9%)
CX	178	(63.7%)

LAD : left anterior descending coronary artery

RCA : right coronary artery

CX : circumflex coronary artery

** **Prospective study data :**

I- Age and Sex

In group 'A', there were 21 males and 9 females with age ranging from 40 to 64 years (mean 53.47 ± 6.58) while in group 'B' there were 20 male and 10 female with age ranging from 45 to 76 years (mean 55.80 ± 6.42), (table 2).

There were no significant difference between the two groups as regard to age and sex.

II- Risk Factors and Clinical Presentation

Among population in group 'A' there was no risk factors in 8 patients (20.6%), 13 patients (43.3%) were smokers, 7 patients (23.3%) had history of hypertension, 3 patients (10%) were diabetic, 5 patients (16.7%) were hypercholesterolemic, 3 patients (10%) were obese and 7 patients (23.3%) had positive family history of coronary heart disease. While in group 'B", 6 patients (20%) had no risk factors ,15 patients (50%) were smokers, 6 patients (20%) had history of hypertension, 5 patients (16.7%) were diabetic, 7 patients (23.3%) had increased serum cholesterol, 2 patients (6.7%) were obese, and 8 Patients (26.7%) had positive family history of coronary heart disease.

As regard to clinical presentation, in group "A", there were eight patients (34.8%) had stable angina, 6 of them (75%) were in class I and the remaining 2 patients (25%) were in class II according to the Canadian cardiovascular society classification. Fifteen patients (65.2%) had unstable angina 6 of them (40%) were in class I and the remaining 9 patients (60%) were in class II according to Braunwald classification of unstable angina. Eighteen patients (60%) had no dyspnea and 12 patients

(40%) had dyspnea, 8 patients of them (66.6%) were in class I,and 4 (33.3%) patients were in class II according to New York Heart Association classification (NYHA).

While in group "B" 7 patients (25.9%) had stable angina, 5 (71.4%) of them were in class I and the remaining 2 patients (28.6%) were in class II according to the Canadian cardiovascular society classification,20 patients (74.4%) had unstable angina, 8 of them (40%) were in class I, 12 patients (60%) in class II according to Braunwald classification of unstable angina. Sixteen patients (53.3%) had no dyspnea and 14 (46.7%) had dyspnea, 9 (64.2%) of them were in class I of NYHA, 4 patients of them (28.6%) were in class II and one patient (7.1%) being in class III of NYHA classification.

In group A there was 4 patients (13.3%) had old myocardial infarction while in group B there was 6 patients (20%) had old myocardial infarction, the localization of MI is shown in (Table 3).

As shown in table 2 and 3, patients with LMCAD had a higher mean age, higher incidence of coronary risk factors (except for hypertenction and obesity),higher incidence and higher grade of dyspnea, higher incidence and more severe anginal attacks and higher incidence of infarction than those patients without LMCAD; however the differences were statistically insignificant ($p > 0.05$).

Table 2: Demographic characteristic

Item / Group	Group A	Group B	Pvalue	Sig.
Age (years)				
Mean ± SD	53.47± 6.58	55.80 ± 6.42	>0.05	NS
Sex				
Male (No. & %)	21 & 70%	20 & 66.7%	>0.05	NS
Female (No. & %)	9 & 30%	10& 33.3%	>0.05	NS

No. Number

SD: standerd deviation

NS: Not significant

Table 3: Base line clinical characteristic

Item * \ Group	Group A N = 30		Group B N = 30		P value	Sign.
Smoking	13	(43.3%)	15	(50%)	>0.05	NS
Hypertension	7	(23.3%)	6	(20%)	>0.05	NS
Diabetes mellitus	3	(10%)	5	(16.7%)	>0.05	NS
Hypercholesterolemia	5	(16.7%)	7	(23.3%)	>0.05	NS
+ve Family History	7	(23.3%)	8	(26.7%)	>0.05	NS
Obesity	3	(10%)	2	(6.7%)	>0.05	NS
Stable Angina	8	(34.8%)	7	(53.3%)	>0.05	NS
Class I candian	6	(75%)	5	(71.4%)	>0.05	NS
Class II candian	2	(25%)	2	(28.6%)	>0.05	NS
Unstable Angina	15	(65.2%)	20	(74.4%)	>0.05	NS
Class I Braunwald Class.	6	(40%)	8	(40%)	>0.05	NS
Class II Braunwald Class.	9	(60%)	12	(60%)	>0.05	NS
Dyspnea	12	(40%)	14	(46.7%)	>0.05	NS
Class I NYHA	8	(66.6%)	9	(64.2%)	>0.05	NS
Class II NYHA	4	(33.3%)	4	(28.6%)	>0.05	NS
Class III NYHA	0		1	(7.1%)	>0.05	NS
Class IV NYHA	0		0			
Old myocardial infarction (M I)	4	(13.3%)	6	(20%)	>0.05	NS
Anterior M I	3	(75%)	4	(66.6%)	>0.05	NS
Inferior M I	1	(25%)	3	(50%)	>0.05	NS

NYHA: New York heart association

* = Number and pecentage of patients having such items.

Canidian : Canidian cardiovascular society Classification of stable angina.

Braunwald class : Braunwald classification of unstable angina.

NS : Not Significant.

III- Resting surface ECG :

In group A

Outside an episode of chest pain,16 patients (53.3%) had an isoelectric ST segment, 8 patients (26.7%) had ST segment depression, 12 patients (40%) had ST segment elevation in aVR and /or V_1,and 4 patients (13.3) had Q wave.

During chest pain, 21 patients (70%) had abnormalities of ST segment, 11 patients (36.7) had ST segment depression.The average number of lead with ST depression was 5.5 lead, 12 patients (40%) had ST segment elevation in lead aVR and /or V_1, ST etevation in a VR was of lower magnitude than in V_1 in most cass. Seven patients (23.3%) had ST segment change in more than 8 out of 12 leads (P pattern) (Table 4).

In group B

Outside and episode of chest pain 7 patients (23.3%) had an isoelectric ST segment, 23 patients (73.3%) had ST segment elevation in aVR and /or V_1, 15 patient (50%) had ST segment depression and 6 patients (20%) had Q wave.

During chest pain all patients had abnormalities of ST segment, 26 patients (86.6%) had ST segment depression, the most frequent pattern was ST segment depression in lead V_3, V_4, V_5 and V_6 with maximal ST depression in lead V_4 . The average number of leads with ST segment depression was 6.5 leads, 25 patients (83.3%) had ST segment elevation in aVR and /or V_1, etevation in a VR was of higher magnitude than in V_1 in most cass. Eighteen patients (60%) showed ST segment changes in more than 8 out of 12 leads (P pattern) (Table 4).

The sensitivity of "P pattern" for LMCAD was 60%, specificity was 76.7%, predictive accuracy was 72%, positive predictive value was 72%, and negative predictive value was 65.7%. There was statistically significant difference between both groups as regard to ST elevation in aVR / V_1 and P pattern ($p < 0.01$ and $p < 0.01$ respectively)(Table 4).

Table (4) Results of comparison between the two groups as regard resting ECG parameters

Item * \ Group	Group A N = 30		Group B N = 30		P value	Sign.
Outside chest pain						
No S-T changes	16	(53.3%)	7	(23.3%)	<0.05	S
ST depression	8	(26.7%)	15	(50%)	<0.05	S
ST elevation in aVR /V1	12	(40%)	23	(73.3%)	<0.05	S
Pathological Q wave	4	(13.3%)	6	(20%)	>0.05	NS
During chest pain						
No S-T changes	9	(30%)	0	(0%)	<0.05	S
ST depression	11	(36.7%)	26	(86.6%)	<0.01	HS
ST elevation in aVR /V1	12	(40%)	25	(83.3%)	<0.01	HS
Average leads with ST. depression	5.5	Leads	6.5	Leads	>0.05	NS
"P" Pattern	7	(23.3%)	18	(60%)	<0.01	HS

S: Significant

NS : Not significant

HS : Highly significant

IV- Echocardiography

The LMCA was successfully imaged by transthoracic echocardiography in 48 patients of the 60 patients studied (80%). The LMCA was noted by 2-D echocardiogram and it was interpreted as diseased in 24 of the 48 patients with adequate images. Twenty patients of those 24 patients were true positive, as defined by the coronary angiography and 4 were false positive. Three patients were false negative with a significant LMCA stenosis noted on the angiogram. So transthoracic 2-D echocardiography correctly identified 20 of these 23 patients. Sensitivity was 87%, Specificity was 84%, The predictive accuracy 83.3%, positive predictive value was 83.3%, and negative predictive value was 87.5% (Table 5).

Systolic left ventricular function and pattern of wall motion.

In group "A" 23 (76.7%) patients had EF ≥ 50% while 7(23.3%) had EF < 50 % , whereas in group B, 21(70%) had EF ≥ 50% while 9 (30%) had EF < 50% , the differences between the two groups were insignificant

For group "A" the mean ejection fraction (EF%) was 53%±8%, mean end systolic diameter was 3.8±0.77cm, mean wall motion score was 20.76±5.26 and mean score index was 1.30 ±0.33, while in group B, mean ejection fraction (EF%) was 50% ±11%, mean end systolic diameter was 3.9±0.74cm, mean wall motion score was 21.23±5.11 and mean score index was 1.33±0.31(Fig. 8 and 9). Again the difference between the two groups as regard to these parameters where insignificant (Table 6). So left ventricular function parameters studied can not be used as a predictor of LMCAD.

***Table 5** : Echocardiographic detection of left main coronary artery disease.*

Total patients screened	60
Patients with successful imaging	48(80%)
Patients with echo-diagnosis of LMCAD	24
False positive	4
False negative	3
Sensitivity	87%
Specificity	84%
Predictive accuracy	83.3%
Positive predictive value (PPV)	83.3%
Negative predictive value (NPV)	87.5%

Table 6: *Systolic left ventricular function and pattern of wall motion in studied population*

Item / Group	GROP A	GROUP B	P value	Sign.
E F % Mean ± SD	53% ± 8%	50% ± 11%	> 0.05	NS
ESD Mean ± SD	3.8 ± 0.77	3.9 ± 0.74	> 0.05	NS
WMS Mean ± SD	20.76 ± 5.26	21.23± 5.11	> 0.05	NS
WMSI Mean ± SD	1.3 ± 0.33	1.33 ± 0.31	> 0.05	NS

EF % : Ejection Fraction

ESD : end systolic diameter

WMS : wall motion score

WMSI: wall motion score index

NS: not significant

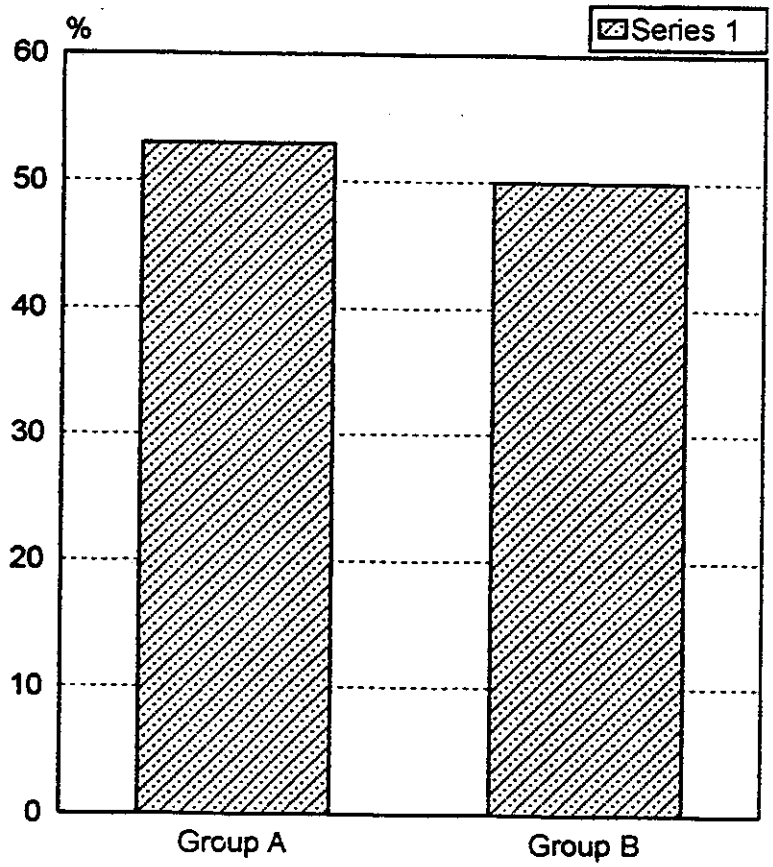

Fig. (8): EF% among both groups patients

Fig. (9): ESD and WMSI in both groups under study

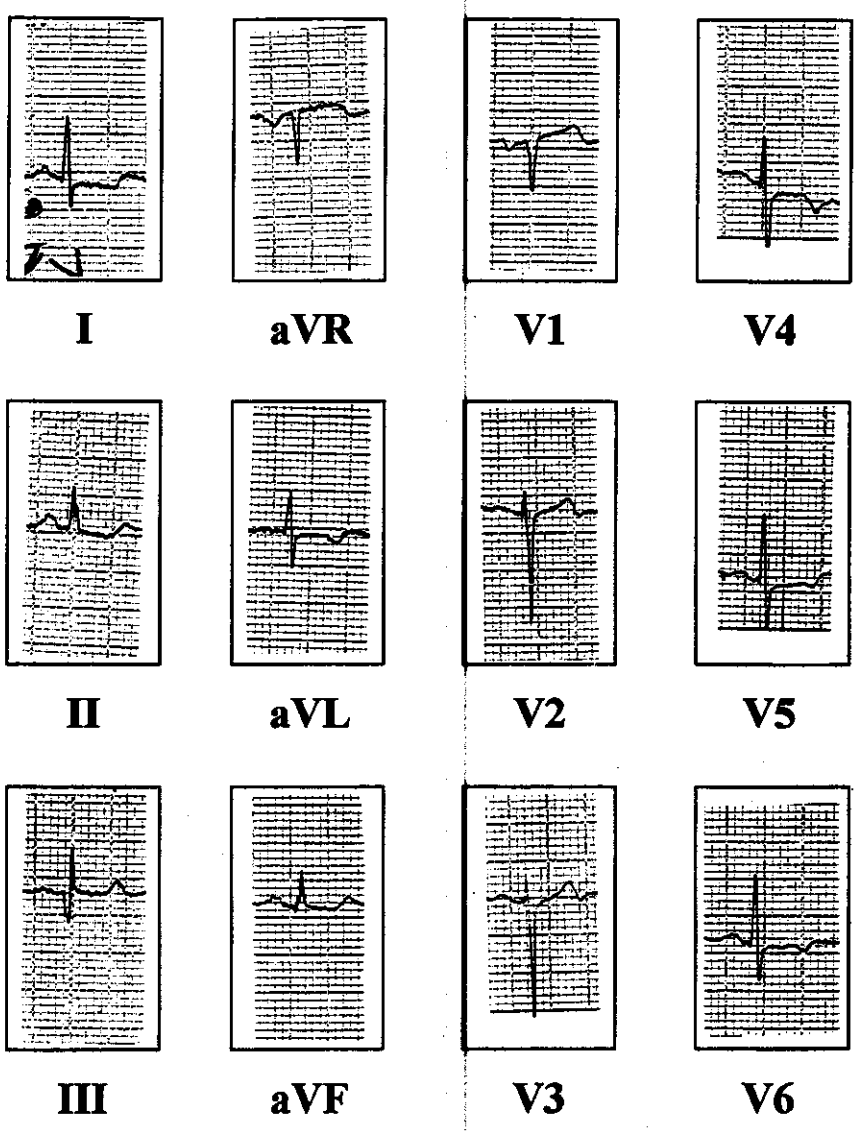

Fig (10) twelve-lead electrocardiogram of patient without LMCAD during an episode of chest pain showing ST elevation in aVR & V_1, and ST depression in I, aVL and V4 – V6. The ST elevation in V1 is higher than that in aVR (patient No. 8).

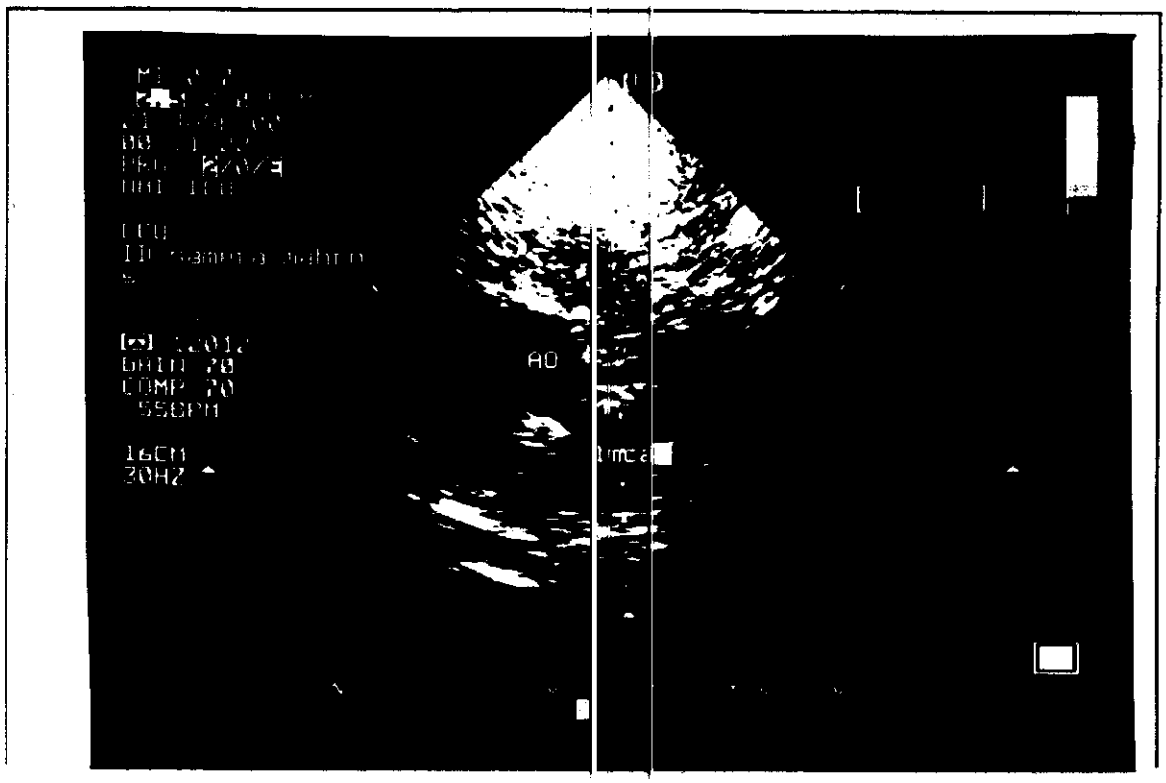

Fig (*II*) Transthoracic echocardiagram (parasternal non-standard short axis view) from patient without LMCAD showing normal left main coronary artery arising from the left coronary sinus (patient No.8)

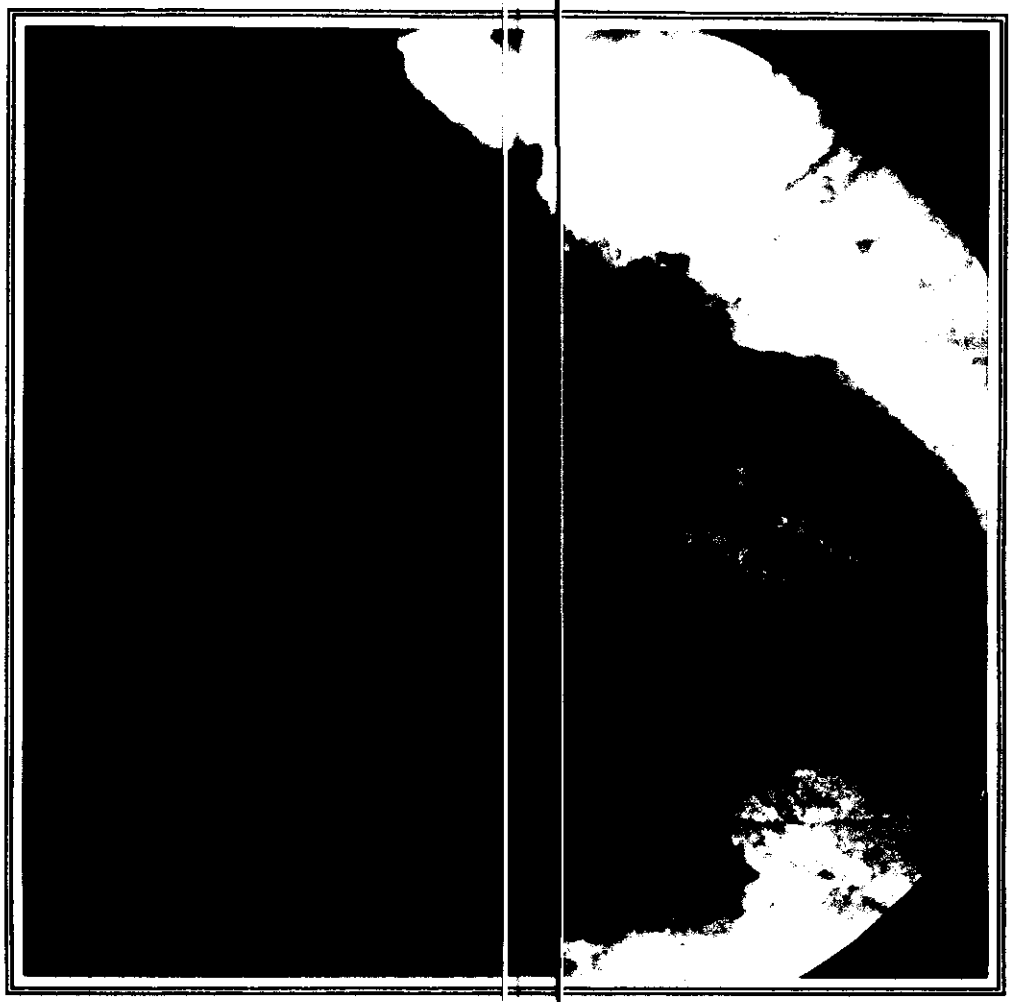

Fig (12) Coronary angiography, anteroposterior view of patient No. 8 showing normal left main coronary artery, proximal lesion 95% in the LAD before first diagonal and mid lesion 50% in the LCX after first obtuse marginal artery (just before second obtuse marginal artery) .

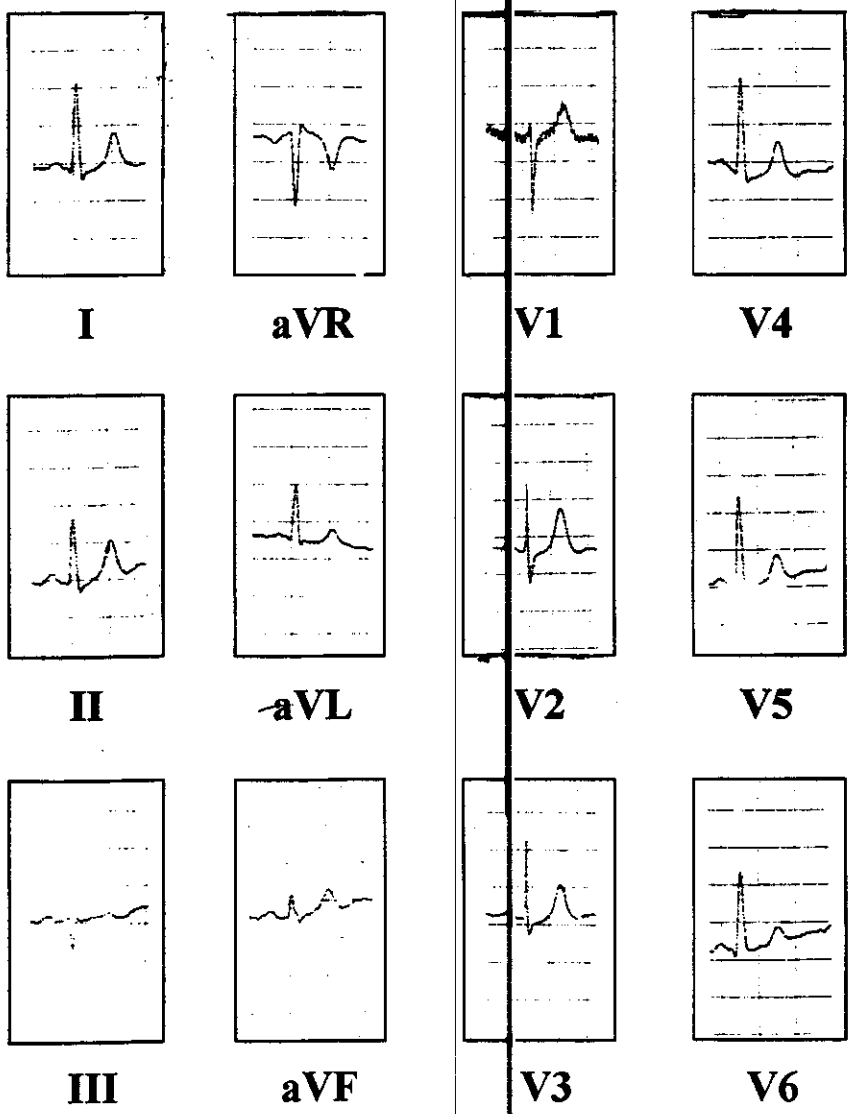

Fig (13) twelve-lead electrocardiogram of patient with LMCAD outside an episode of chest pain showing ST elevation in aVR & V_1, and ST depression in V3 and V4. The elevation in aVR is higher than that in V1(patient No. 40).

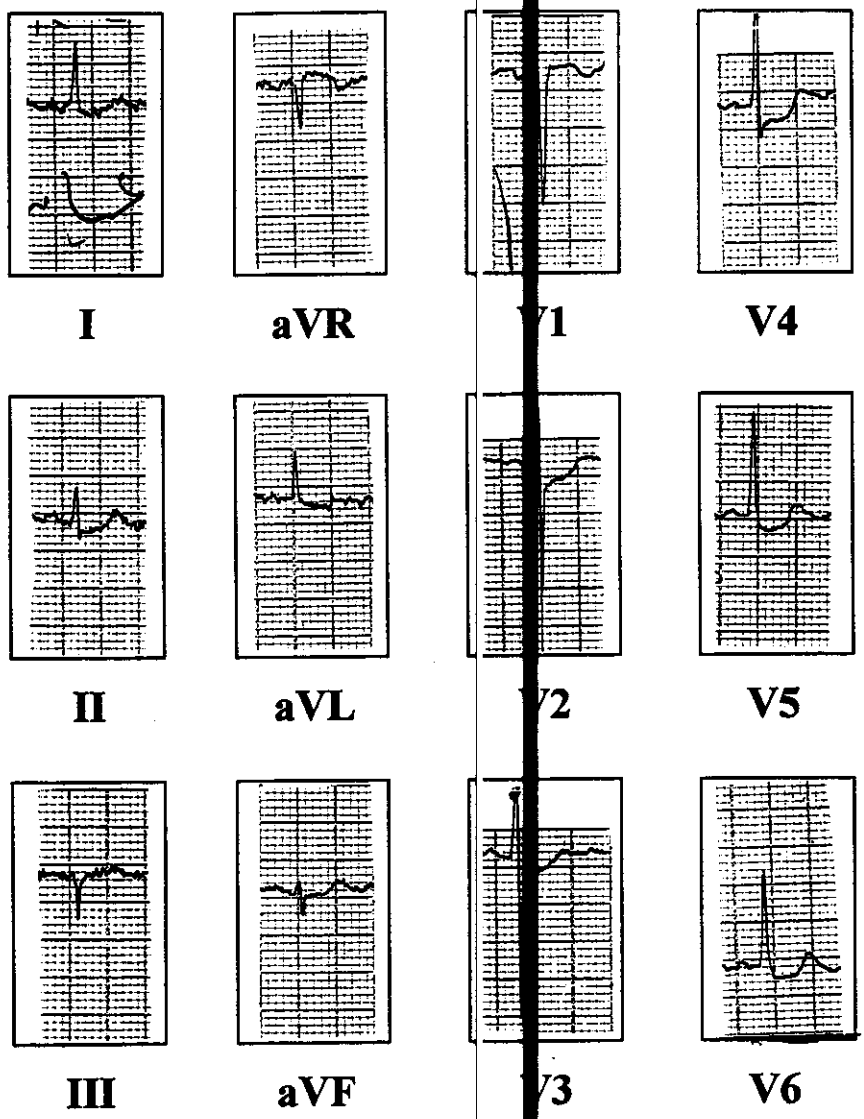

Fig (*14*) twelve-lead electrocardiogram of patient with LMCAD during an episode of chest pain showing ST elevation in aVR & V_1, and diffuse ST depression in both pericardial and limb leads, (patient No.40)

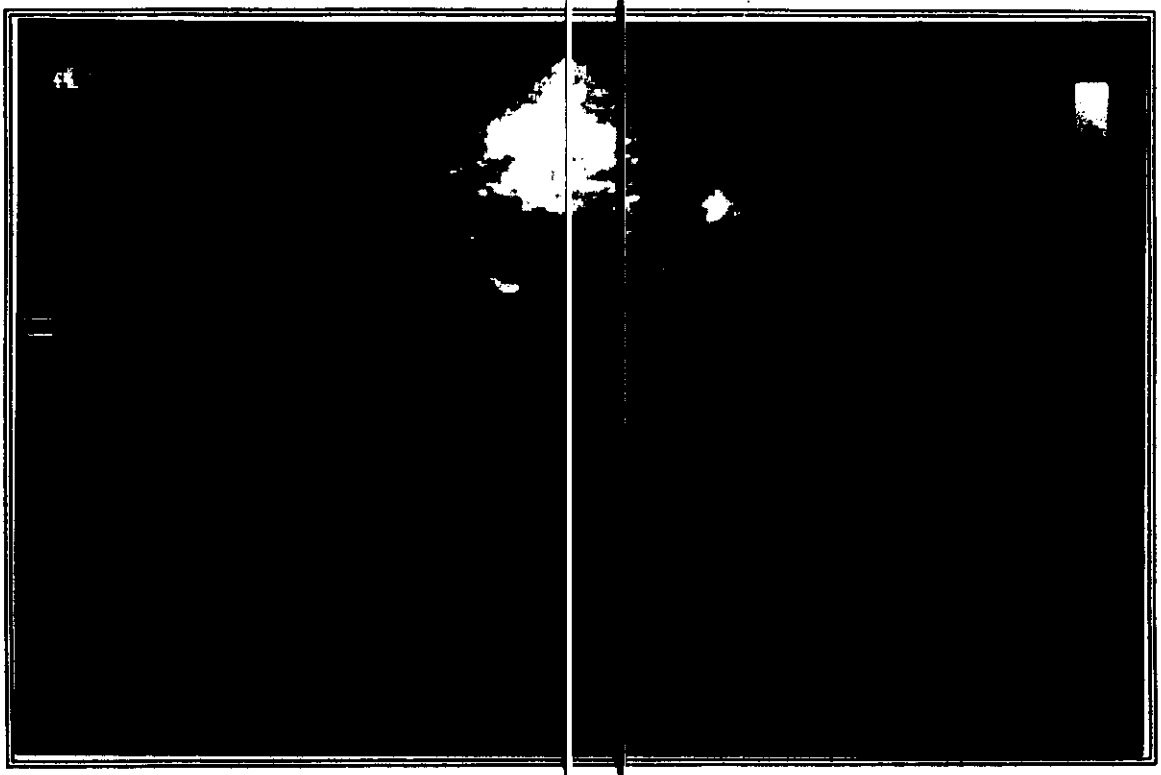

Fig (15) Transthoracic echocardiagram (parasternal non-standard short axis view) from patient with mid LMCAD showing high intensity echoes on the lumen of the vessel. Its bifurcation is seen beyond this point (patient No.40)

Fig (16) Coronary angiography, RAO with cranial view of patient No. 40 showing mid segment lesion 80% in the left main coronary artery, proximal lesion 75% in LAD after first diagonal and very small non dominant LCX.

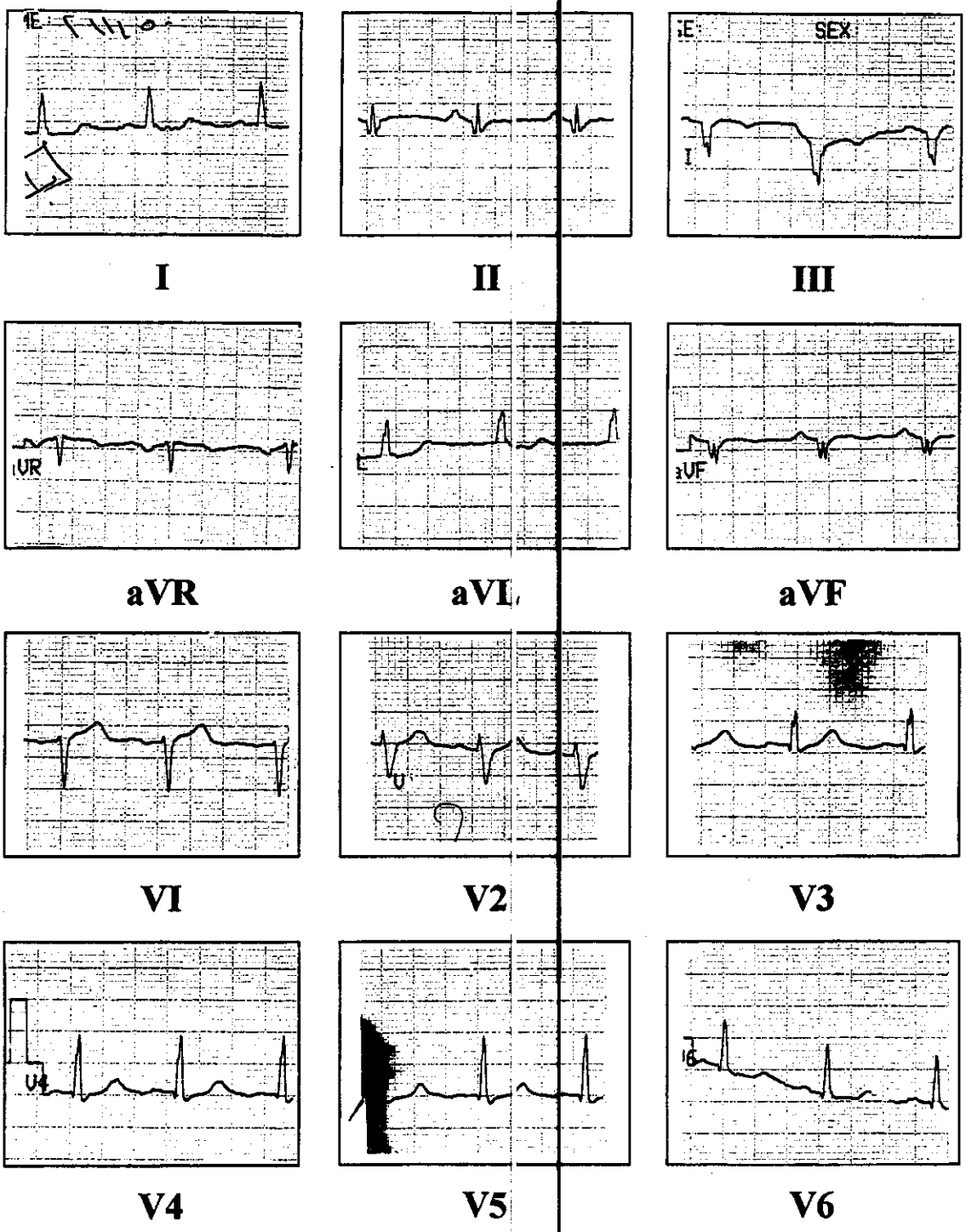

Fig (17) twelve-lead electrocardiogram of patient with LMCAD outside an episode of chest pain showing ST elevation in aVR & V_1, and Q wave in III and aVF (patient No. 42)

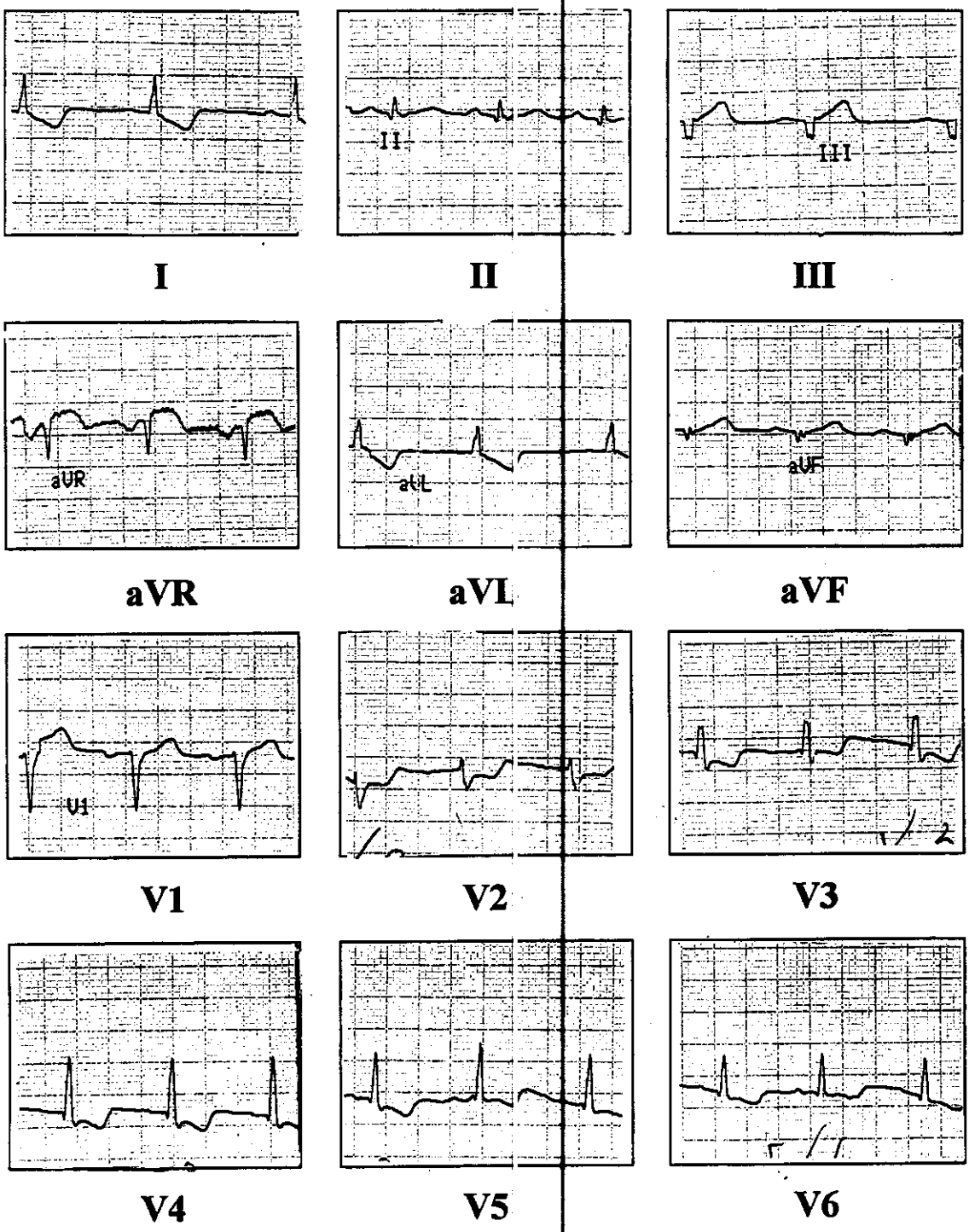

Fig (*18-*) twelve-lead electrocardiogram of patient with LMCAD during an episode of chest pain showing ST elevation in aVR & V_1, diffuse ST depression in both pericardial and limb leads, and Q wave in III and aVF (patient No. 42)

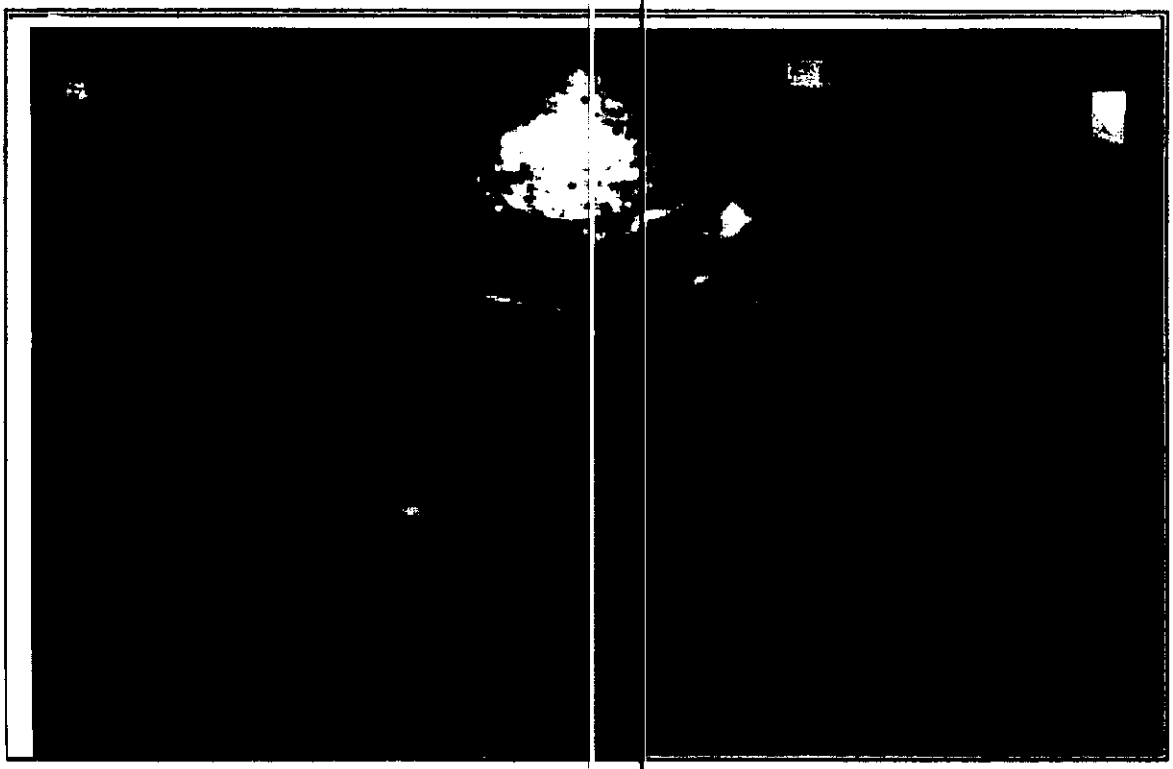

Fig (*19*) Transthoracic echocardiagram (parasternal non-standard short axis view) from patient with mid and distal LMCAD showing high-intensity echoes on the lumen of the vessel. Its bifurcation is seen beyond this point (patient No.42)

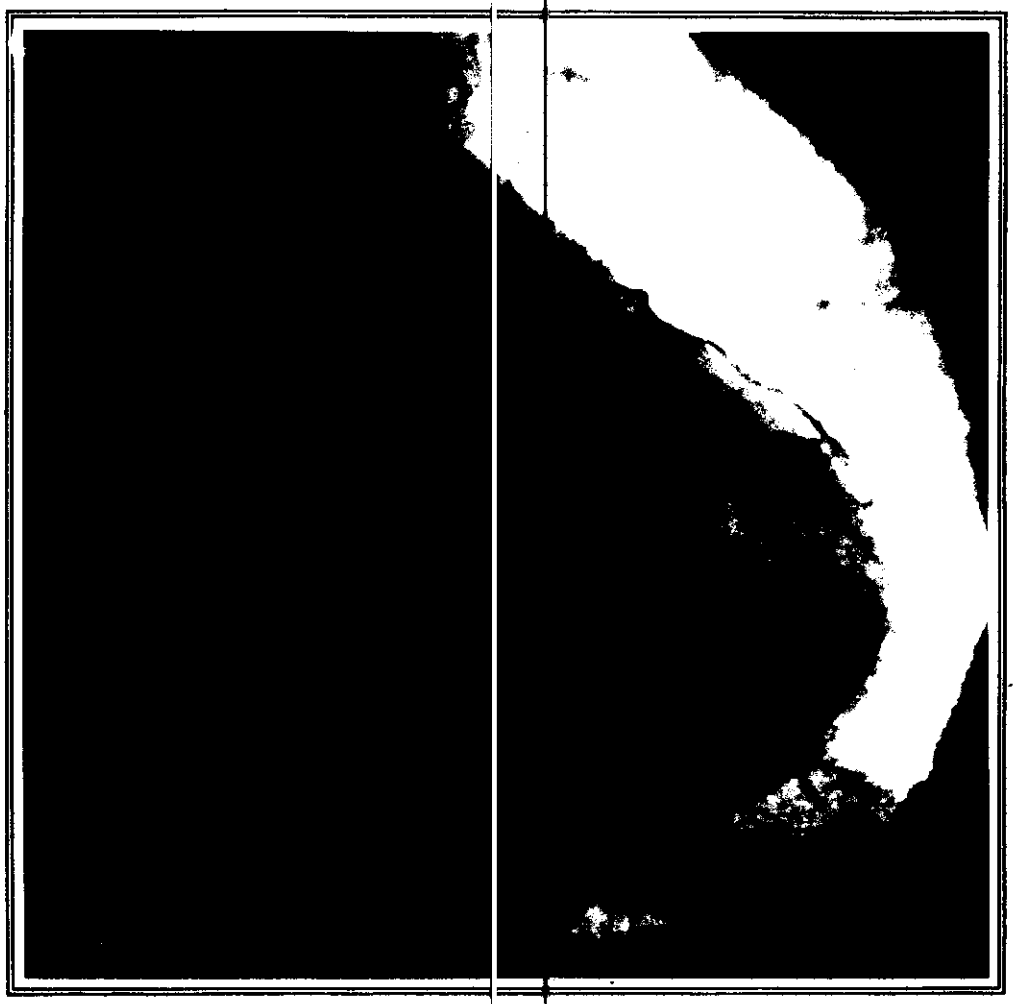

Fig (20) Coronary angiography, anteroposterior view of patient No. 42 showing long lesion in the left main coronary artery, (mid and distal segments), in the LCX there are osteal lesion 80% and long mid lesion 70%.