Results

The age range of the studied patients was 32 to 59 years and the mean age was 47.8 ± 7.4 years. The age range of the control subjects was 31 to 44 years and the mean age was 38.5 ± 4.8 years. Among the forty patients studied there were 27 males (68%) and 12 females (32%) while among the control subjects there were 7 males (70%) and 3 females (30%). (Table 4)

As regard coronary risk factors,

Sixty percent of the patients group were smoker, fifty two percent were hypertensives and sixty- two percent were diabetic, while thirty percent of the patients had hypercholesterolemia (table 4).

Six patients (15%) had stable angina, thirteen patients (32.5 %) had unstable angina and twenty – one patients (52.5%) had myocardial infarction. (table 4).

Population Demographics: Table (4)

	Controls (N=10)	Patients (N=40)
Mean age. In years	38.5 ± 4.8	47.8 ± 7.4
Male/ femal (%)	70% / 30%	68% / 32%
Smokers (No & %)	----	24 (60%)
Hypertensives (No&%)	----	21 (52%)
Type II diabetics (No&%)	----	25 (62%)
Hypercholesterolemics (No&%)	----	12 (30%)
Stable angina (No&%)	----	6 (15%)
Unstable angina (No& %)	----	13 (32.5%)
myocardial infarction (No&%)	----	21 (52.5%)

Results

Coronary arteriographic findings revealed that forteen patients (35%) had single vessel disease, twenty – two patients (55%) had double vessel disease and four patients (10%) had three – vessel disease. (table 5).

Table (5) coronary angiographic findings in patients group

Angiographic finding	Number of patients	Percentage
Single vessel disease	14	35%
Two – vessel disease	22	55%
Three vessel disease	4	10%

By 2 – D echo the mean ejection fraction was 65.1 ± 2.4 with a range of 61 to 70 in control group .

In patients group, the mean EF was 45.4 ± 4.2 with a range of 38 to 58.

By color kinesis, the mean EF was 68.4 ± 2.6 with a range of 64 to 72 in control group, while in patients group it was 48.7 ± 5.1 with a rang of 37 to 58.

By contrast ventriculography, the mean EF was 50.2 ± 4.7 with a range of 38 to 58 for the patients group.

The EF measured with CK was more accurate than that measured by 2-D echo when both were compared with that measured by contrast ventriculogram which was considered the gold standard in this work. The correlation between the three methods was presented in (table 6) which also showed that CK is more closely correlated with contrast ventriculography than 2-D echo as regard EF measurement, although both techniques (2-D and Ck) showed very close correlation.

Table (6) Correlation coefficient (r) and probability value (p) of ejection fraction measured by different methods.

	r	P
2-D Vs Ck	0.94	0.0001
2-D Vs Angio	0.95	0.0001
CK Vs Angio	0.97	0.0001

Fig (18) , (19) and (20) showed a very close correlation between the different methods used in EF measurement.

- ***Segmental wall motion abnormalities :***

All the 70 segments(10 control subjects with seven segments each) were analyzed by conventional 2-D echocardiography and color kinesis. All the segments showed normal color width (>5mm) and color number (ranged from g to 11 colors). The pattern of segmental wall motion during systole was found to be consistent and reproducible by both techniques.

In patients group, a total of 280 segments (40 patients with seven segments each) were analyzed by conventional 2-D echocardiography, color kinesis and contrast left ventriculography. All the segments were analyzed :

- By 2-D echocardiography, there were 193 segments (68.9%) appeared normal, 61 segments (21.7%) appeared hypokinetics, 14 segments (5%) appeared akinetics, and 12 segments (4.2%) appeared dyskinetics (table 7).
- By color – kinesis, there were 174 segments (62.2%) appeared normal, 70 segments (25%) appeared hypokinetics, 19 segments (6.7%) appeared akinedtics and 17 segments (6.1%) appeared dyskinetics (table 7).

- By contrast ventriculography there were 179 segmets (63.9%) appeared normal, 67 segments (23.9%) appeared hypokinetics, 18 segments (6.4%) appeared akinetics and 16 segments (5.8%) appeared dyskinetics (table 7).

Table (7) showed agreement between contrast ventriculography and conventional 2-D echocardiography and color-kinesis in the diagnosis of systolic wall motion .

	2-D echo		Color-kinesis		
	No of segments	Agreements	No of segments	Agreements	P*
Normal	193	92.7%	174	97.2%	<0.05
Hypokinetic	61	91%	70	95.7%	<0.05
Akinetic	14	77.7%	19	94.7%	<0.05
Dyskinetic	12	85%	17	94.1%	<0.05
All abnormal segments	87	86.1%	106	95.2%	<0.05

- ***Analysis of different segments.***

Anterior basal segment and posterior basal segment was the most segments that can be accurately assessed with color kinesis compared to contrast ventriculography. Color-kinesis improves greatly the analysis of both segments (table 8). On the other hand the apicolateral segment was the most difficult area to visualize using both 2-D and color kinesis, however, color kinesis was also superior to 2-D echo in assessment of this segment (table 8).

Table (8) showed agreement of color kinesis and 2-D echo compared with contrast ventriculography considered as the reference method for evaluation of each segment.

	Agreement		
	Color-kinesis	2-D echo	P value *
Anterior base	100 %	86 %	<0.05
Posterior base	91 %	80 %	<0.05
Anterior wall	81 %	68 %	<0.05
Posterior wall	79 %	61 %	<0.05
Lateral wall	66 %	53 %	<0.05
Septum	67 %	60 %	NS
Apex	82 %	68 %	<0.05
All segments	81 %	68 %	

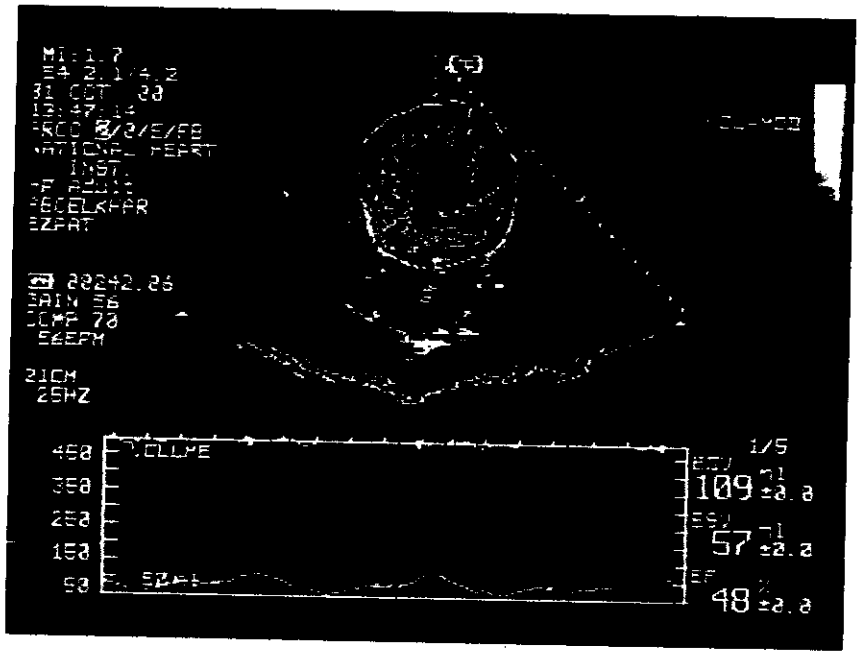

Fig (13) measurement of EF by AQ
Patient No (36)

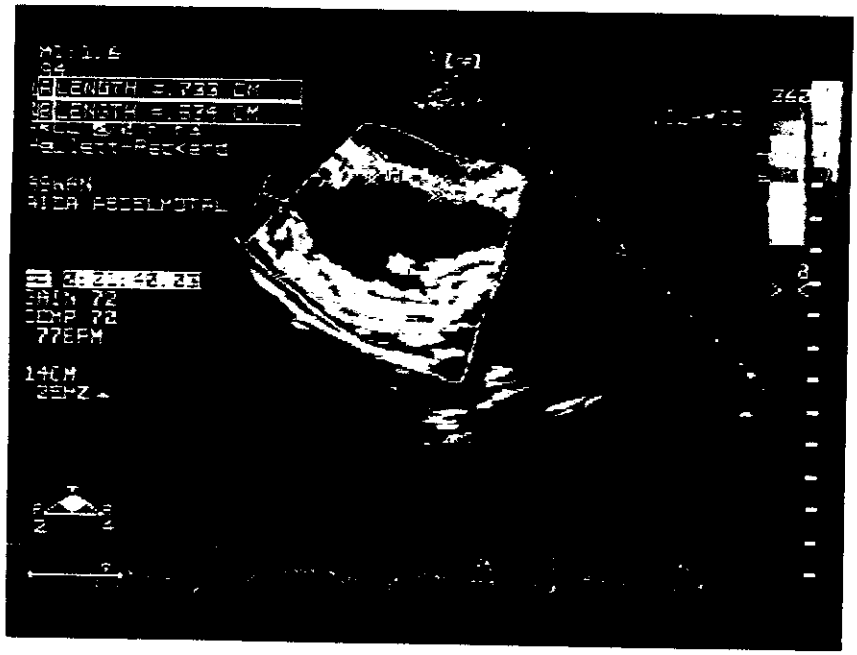

Fig. (14) normal motion
Control subject No. (5)

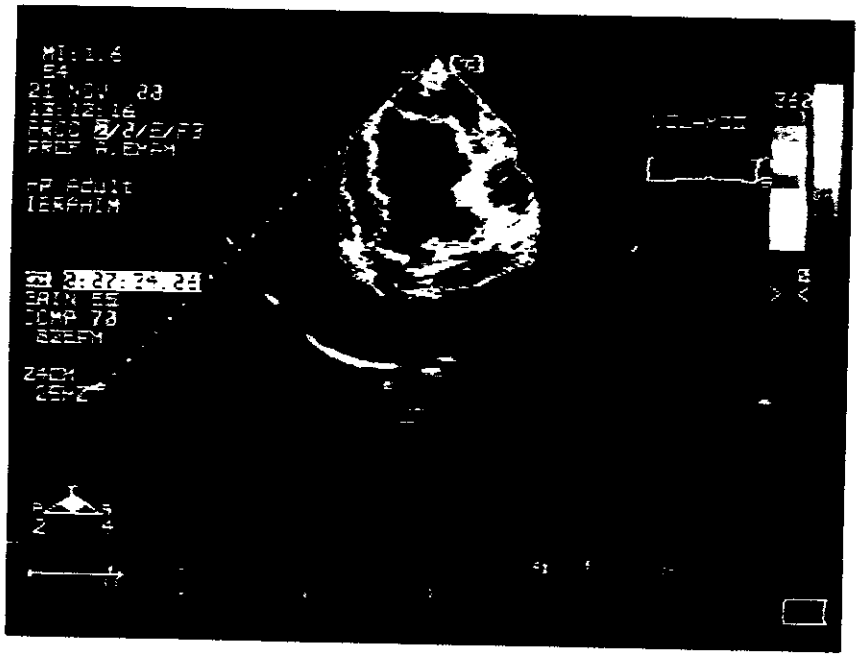

Fig. (15) Apicolateral and Septal hyprokinesia
Patient No. (15)

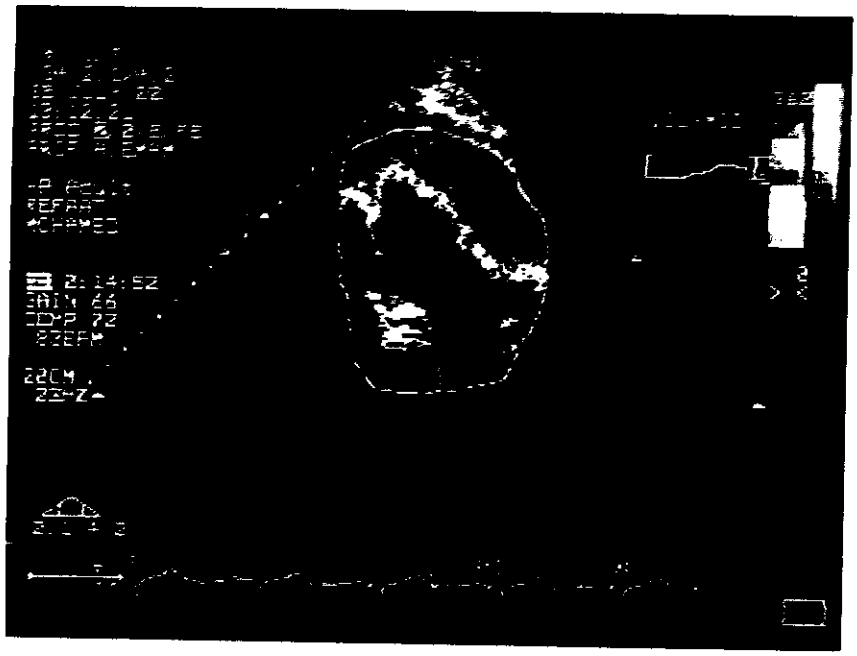

Fig. (16) septal akinesia and lateral wall hypokinesis
Patient No. (16)

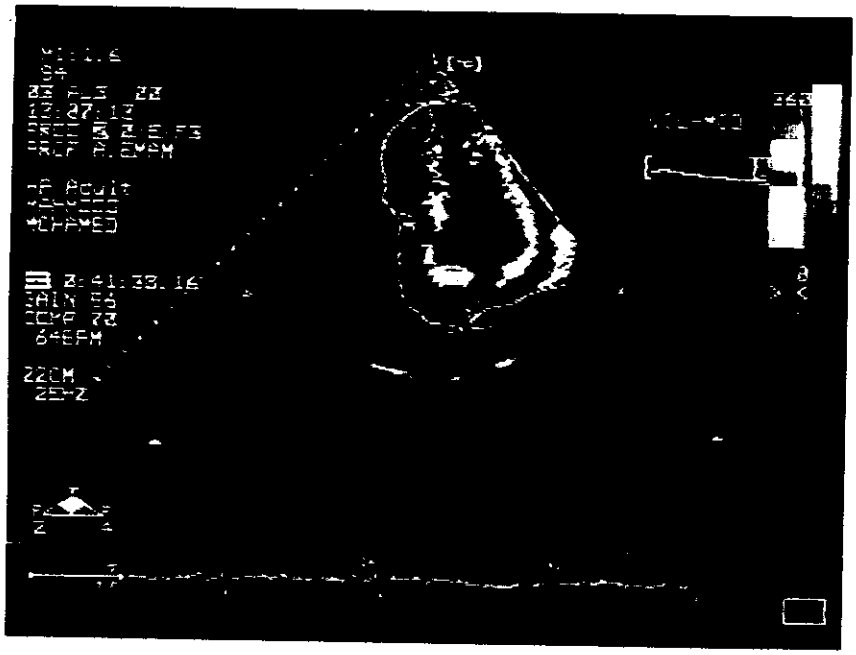

Fig. (17) Apico – septal dyskinesia
Patient No. (14)

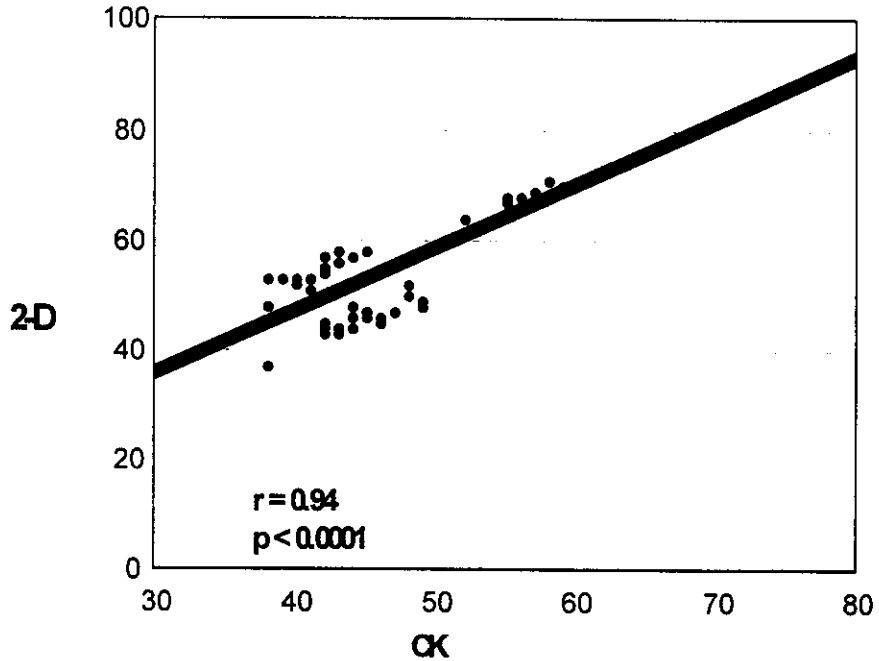

fig (12) correlation between EF maesured by 2-D and color kinesis in all population

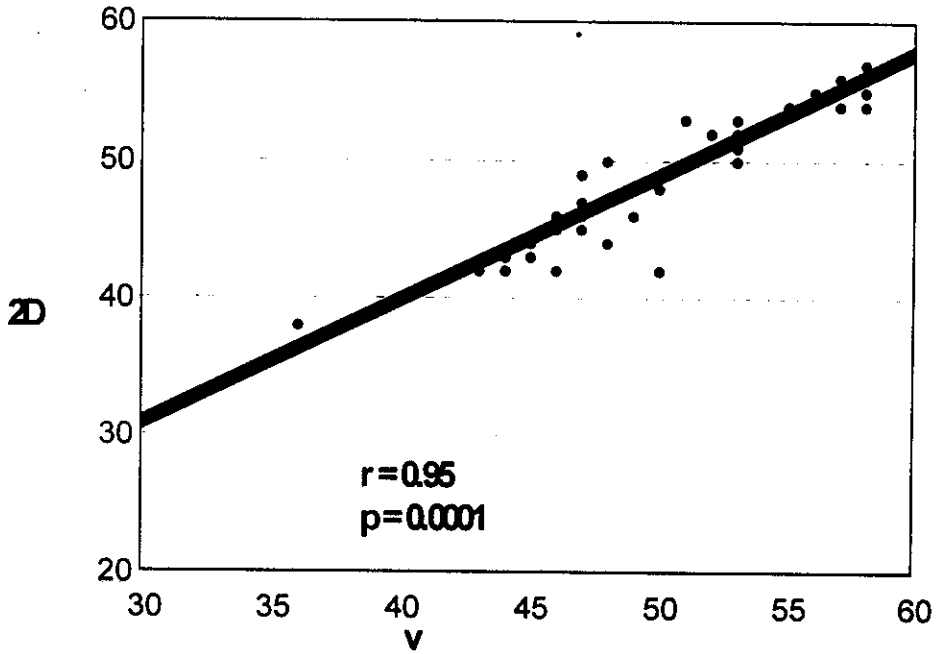

fig (9) correlation between EF measured by 2-D echo and ventriculogram (V)

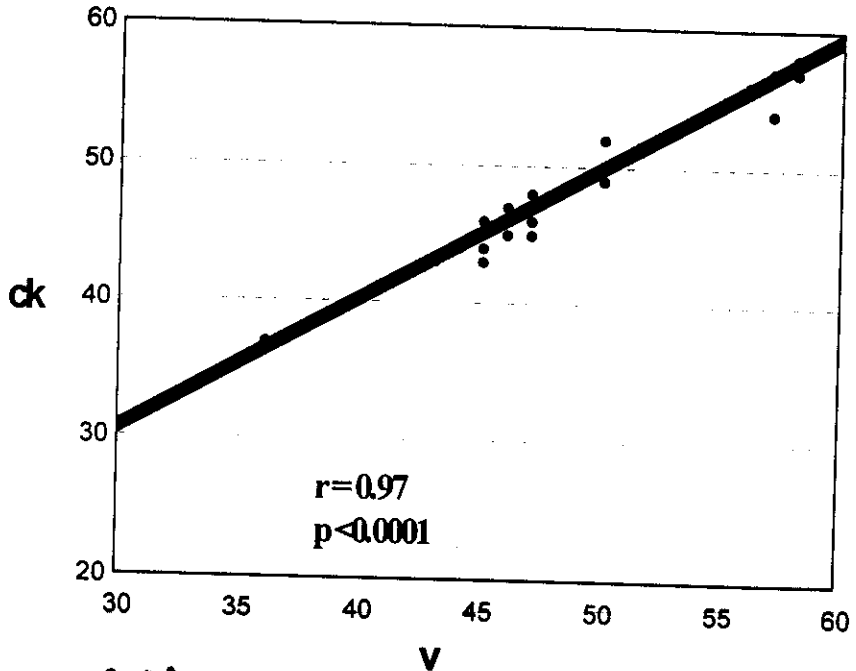

fig (29)correlation between EF measured by color kinesis (ck) and ventriculogram(v)