Results

This study included thirty patients with ischemic heart disease diagnosed by coronary angiography and underwent coronary artery by-pass surgery in Cairo university hospital during the period between February and July 2010.

Demographic characteristics of the patients:

- The mean age of patients enrolled was 53.43± 8.44 years (range from 35 to 67 years)
- Other criteria of patient are demonstrated in table (1).

Table (1): Criteria of enrolled patients

Criteria	Number	Percent
• **Sex**		
Male	18	60
Female	12	40
• **HTN**		
Absent	18	60
Present	12	40
Diabetes		
Absent	24	80
Present	6	20
Smoking		
Absent	20	66.6
Present	10	33.3
RCA disease		
Absent	18	60
Present	12	40

As shown in table (1) 60% of patients enrolled in the study were males (18 patients) while 12 patients (40 %) were females.

Also 40 % of patients were hypertensive (12 patients) while 60% of patients were normotensive, diabetes was found in only 20 % of patients (6 patients) and was absent in 80% of patients. Only 33.3% of patients were smokers, RCA disease was present in 40% of patients (12 patient

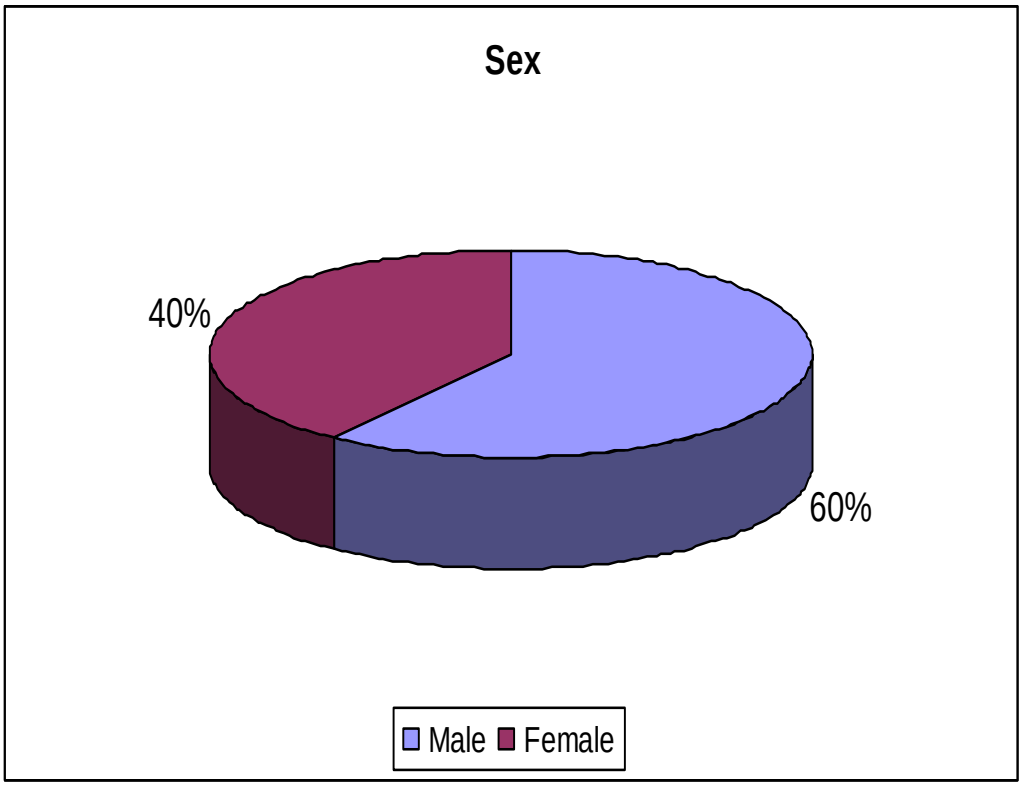

Figure 3: sex distribution among the studied patients

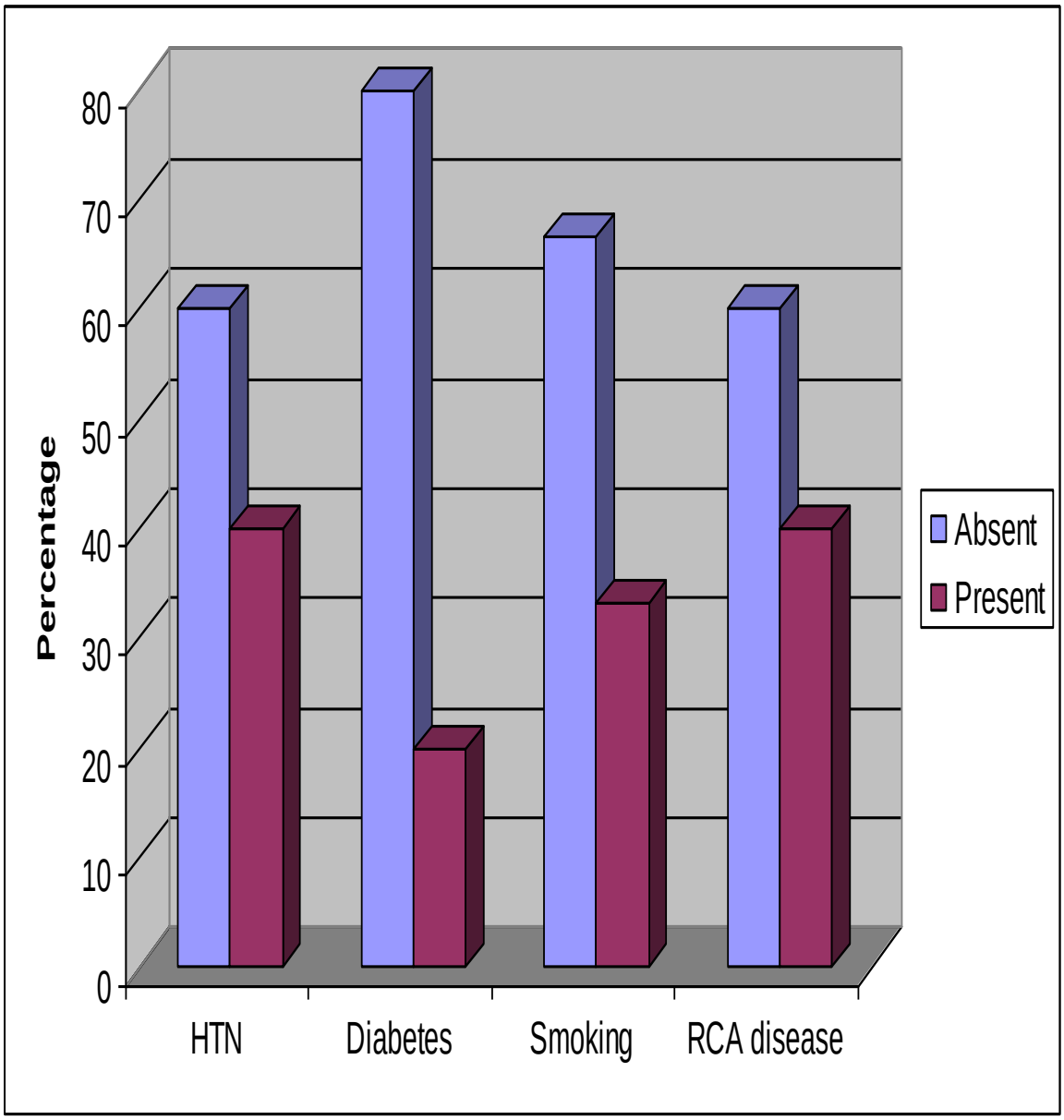

Figure 4 pre operative demographic data

Table (2): Preoperative Laboratory investigations.

Variable	Value	Normal range
RBS	154.73 mg/dl	80-120 mg/dl
s. creatinine	0.937 mg/dl	0.5-1.2 mg/dl
BUN	17.9 mg/dl	5-23 mg/dl
Na	134.1 meq/L	135-145 meq/L
K pre	3.7 meq/L	3.5-5.5 meq/L
Mg pre	1.947 meq/L	1.6-2.6 meq/L
AST	25.8 IU/L	38 IU/L
ALT	28.75 IU/L	10-65 IU/L
S. alb	3.88 mg/dl	3.5-5mg/dl
Hb pre	13.4 gm/dl	14-18 gm/dl
S.cholesterol	207.4 mg/dl	50-200 mg/dl
TG	145.33 mg/dl	150 mg/dl
HDL	32.77 mg/dl	35-70 mg/dl
LDL	79.73 mg/dl	70-100 mg/dl

As shown in table 2 the mean value of RBS was 154.73, serum creatinine was 0.9, BUN was 17.9, serum sodium, potassium and magnesium were 134.1, 3.7 & 1.947 respectively, AST & ALT were 25.8 & 28.75 respectively, serum albumin & hemoglobin were 3.88 & 13.4 respectively. The lipid profile was as follows the serum cholesterol was 207.4 while serum triglycerides, HDL & LDL were 145.33, 32.77 & 79.73respectively.

Table (3): Pre operative ECG data

		p dur mx	Pdur mi	P disp
Total	Mean	95.23	70.77	24.47
	Std. Deviation	4.023	4.049	4.953

Abbreviations: - **p dur mx**: *maximum P wave duration*

- **P dur min**: *minimum P wave duration*
- **P disp.** : *P wave dispersion*

Preoperative 12 leads ECG was done to all patients. It was used to calculate the p wave duration & the p wave dispersion. It showed that the mean value of the maximum p wave duration was 95.23± 4.023. The minimum P wave duration was 70.77±4.049 and the calculated P dispersion was 24.47±4.953.

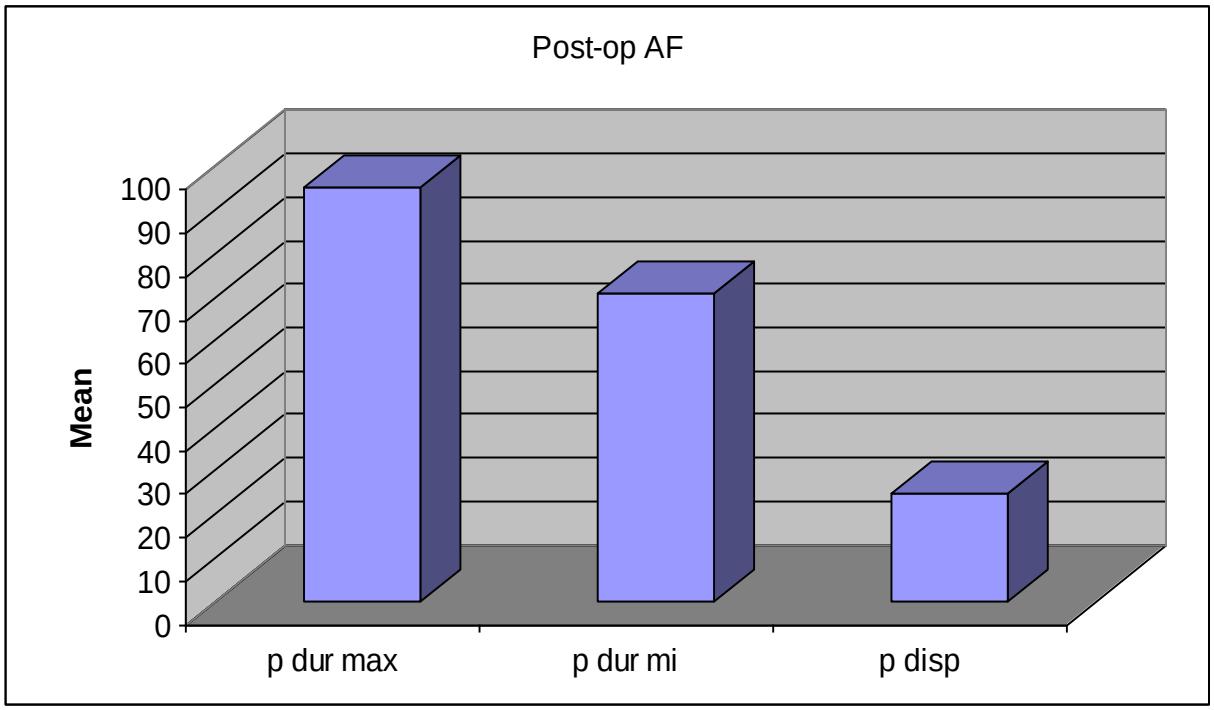

Figure 5: mean values of p wave duration and dispersion

Table (4): Preoperative Echo criteria

Variable	Mean value	Normal range
LVEDd	5.133	3.5-5.6
LVESd	3.417	
IVS	0.903	0.7-1.1
PWT	0.897	0.7-1.1
RV	1.831	1.7-2.7
FS	32.16	25-40%
EF	61.37	55-80%
LAD	3.527	1.9-4
LA vol	58.87	38

Preoperative echocardiography was done to all patients the mean value of LVEDd was 5.133, LVESd was 3.417, IVS was 0.903, PWT was 0.897, RV was 1.831, LAD was 3.527.The mean value of LAV was 58.87 ml and the mean FS was 32.16% .The mean EF was 61.37.

Table (5): Mean value of AEMI calculated by Tissue Doppler preoperatively

Variable	Mean value	Normal range
AEMI	107.83	110-120

Tissue Doppler done preoperatively showed that the mean value of AEMI in all patients was 107.83.

Table (6): Post operative Laboratory investigations

Variable	Value	Normal range
Hb post	12.5	11- 15
K post	3.727	3.5-5.5
Mg post	1.8	1.6-2.6

As shown in table 6, the mean post operative values of serum hemoglobin, potassium and magnesium were 12.5, 3.7 & 1.8 respectively.

Table (7): A comparison between pre and post operative echo values

Variable	Preoperative	Post operative	P value
LVEDd	5.133	5.10	0.723
LVESd	3.417	3.39	0.624
IVS	0.903	0.9	0.741
PW	0.897	0.889	0.883
RV	1.831	1.82	0.891
FS	32.16	33.529	0.547
EF	61.37	67.06	0.134
LAD	3.527	3.49	0.712
LA vol.	55.87	54.69	0.442

As shown in table 6 there is no significant difference between the pre and post-operative echo data.

- **Patients included in the study were classified into 2 groups:**

Group I: patients who developed post operative AF.(10 patients)

Group II: patient who did not develop post operative AF. (20 patients)

Table (8): Data of patients in the two groups

	Group I(AF)		Group II(non AF)		p value
	Number 10	Percent 33.33%	Number 20	Percent 66.66%	
Age	53.7		53.3		0.93
HTN	5	50%	7	35%	0.429
DM	2	20%	4	20%	0.1
Smoke	4	40%	6	30%	0.58
RCA disease	8	80%	4	20%	0.002

- There was no statistically significant difference in the mean age between patients in group I (53.7) and group II (53.3) *p* value=0.93
- There was no statistically significant difference between the two groups regarding the presence of hypertension. 50% of group I were hypertensive versus 35% of group II. *P* value=0.429.
- There was also no statistically significant difference for the presence of diabetes and smoking between the two groups. In group I there were 2 diabetics & 4 smokers versus 4 diabetics & 6 smokers in group II. The p values are 0.1 & 0.58 respectively.
- The presence of RCA disease showed a significant difference between the two groups as it was present in 80 % in group I & only 20 % in group II with a *p value* of 0.002

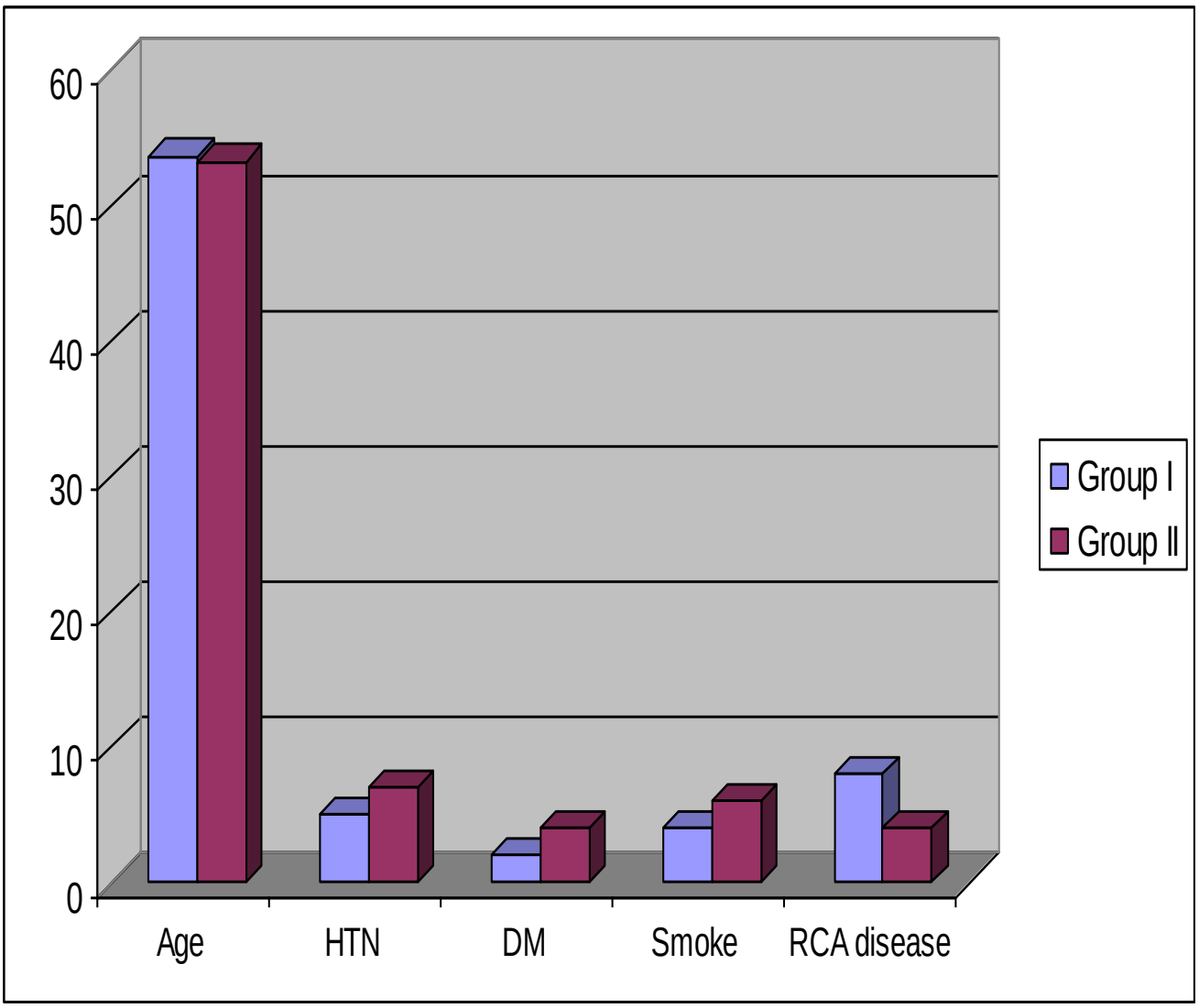

Figure 6: the relation between age, HTN, DM, smoking and RCA disease in group I and group II.

The table (9): Preoperative laboratory data of the patients in group I and group II.

Variable	Group I	Group II	P value
RBS	146.2mg/dl	159 mg/dl	0.868
S,cr	0.88 mg/dl	0.965 mg/dl	0.468
BUN	15.9 mg/dl	18.9 mg/dl	0.072
Na	135.5 meq/l	133.4 meq/l	0.223
K pre	3.73 meq/l	3.71 meq/l	0.808
Mg pre	1.96 mg/dl	1.94 mg/dl	0.839
AST	24 IU/l	26.7 IU/l	0.791
ALT	34.6 IU/l	25.83 IU/l	0.052
s.alb	3.8 gm/dl	3.91 gm/dl	0.707
Hb pre	13.35 gm/dl	13.5 gm/dl	0.647
s. cholesterol	220mg/dl	201.1mg/dl	0.235
TG	160.6 mg/dl	137.7 mg/dl	0.078
HDL	32.8 mg/dl	32.45 mg/dl	0.910
LDL	82.5 mg/dl	78.35 mg/dl	0.171

There was no statistically significant difference between the two groups regarding preoperative lab data.

The mean value of the serum random blood sugar in group I was 146.2 while it was 159 mg/dl in group II with a p value of0.868, The mean value of the serum creatinine in group I was 0.88 mg/dl while it was 0.9 mg/dl in group II with a p value of 0.468. The mean value of the serum BUN in group I was 15.9 while it was 18.9 mg/dl in group II with a p value of 0.072, The mean value of the serum sodium & potassium in group I were 135.5 & 3.73while they were 133.4 & 3.71in group II with a p value of 0.223 & 0.808 respectively, The mean value of the serum

magnesium in group I was 1.96 while it was 1.94 mg/dl in group II with a p value of 0.839, The mean value of the liver enzymes (AST & ALT) in group I were 24 & 34.6 while they were 26.7 & 25.83 in group II with p values of 0.791 & 0.052 respectively, The mean value of the serum hemoglobin in group I was 13.35 while it was 13.5gm/dl in group II with a p value of 0.647, The mean value of the serum cholesterol in group I was 220 while it was 201.1 mg/dl in group II with a p value of 0.235. The mean value of the serum triglycerides in group I was 160.6 while it was 137.7 mg/dl in group II with a p value of 0.078. The mean values of the serum HDL & LDL in group I were 32.8 & 82.5 while they were 32.45 & 78.35 mg/dl in group II with p values of 0.910 & 0.171 respectively.

The table (10): Postoperative laboratory data in group I & II

Variable	Group 1	Group 2	P value
Hb post	12.7gm/dl	12.4 gm/dl	0.924
K post	3.76 meq/l	3.71 meq/l	0.562
Mg post	1.8 mg/dl	2 mg/dl	0.004

There was no statistically significant difference in the mean values of the serum Hb and serum K post operatively between patients in group I (12.7 & 3.76) and group II (12.4 & 3.71). P value was 0.924 & 0.562 respectively.

The only variable that showed a significant difference was the post operative Mg level where the mean value in group I was 1.835 mg/dl Vs 2.00 mg/dl in group II with a *p value* of (0.004).

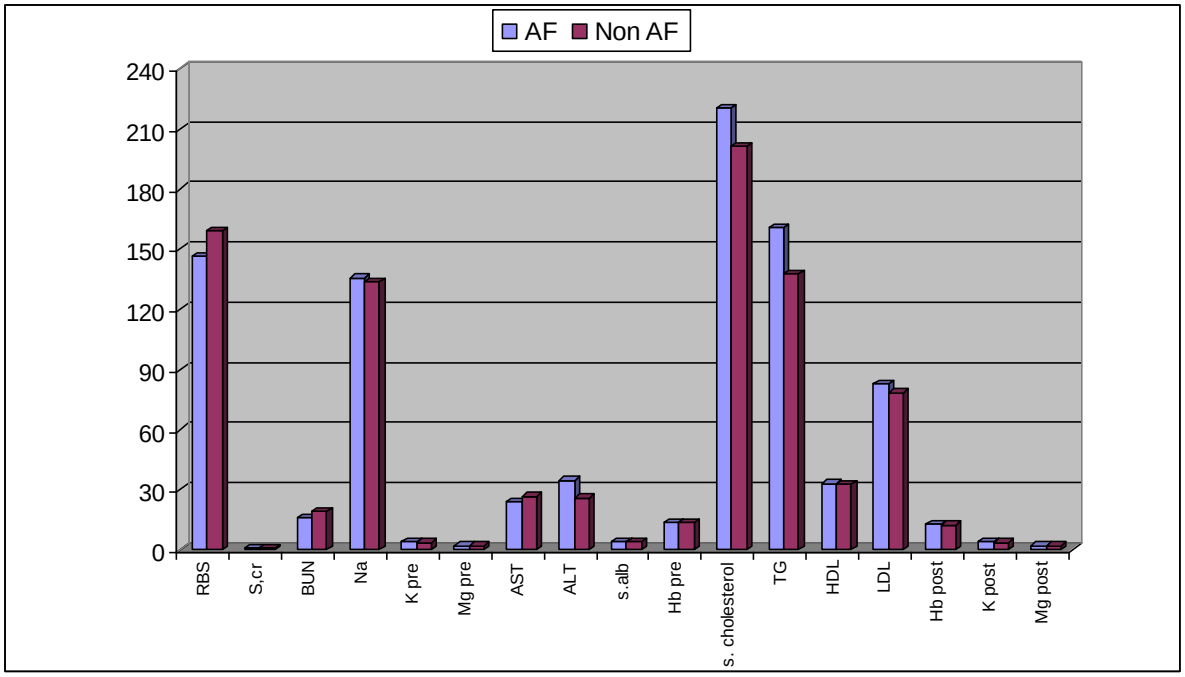

Figure 7: The relation between the laboratory findings in group I & II

- ECG findings in group I and group II:

Table (11): comparison between the maximum p wave duration in the two groups

Maximum p wave duration (msec)	Group 1	Group 2	P value
Range	92-103	85-100	
Mean value	97.7	94	0.022
Standard deviation	3.01	3.94	

- Data obtained from the preoperative 12 leads ECG showed a maximum duration of p wave among patients in group I ranging from 92 to 103 with a mean value of 97.7 and a standard deviation of 3.01 and those in group II ranged from 85 to 100 with a mean value of 94 and a standard deviation of 3.94 .The difference between the two groups was statistically significant.(p value=0.022).

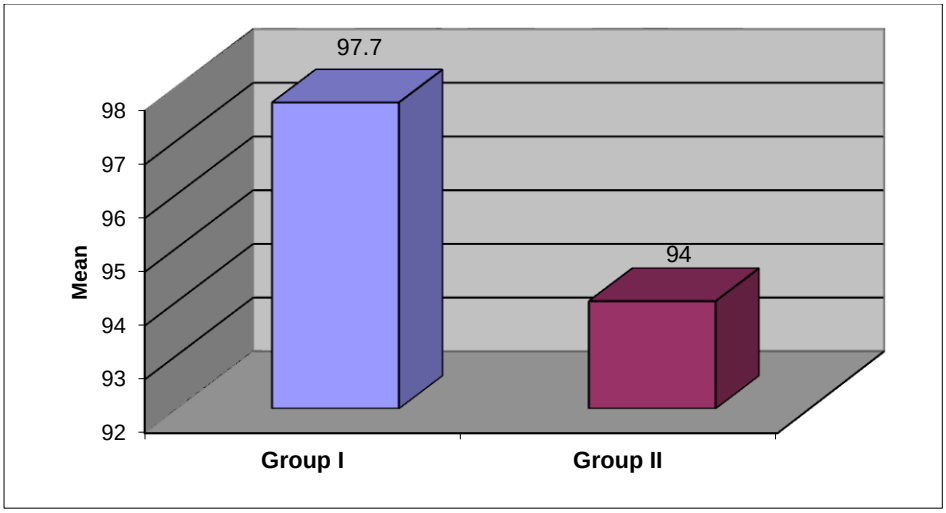

Figure (8): The relation between the maximum p wave duration in group I & group II.

Table (12): comparison between the minimum p wave duration in the two groups

Minimum p wave duration (msec)	Group 1	Group 2	P value
Range	67-78	60-77	
Mean value	71	70.6	0.64
Standard deviation	4.3	4.06	

The table shows a minimum duration of p wave among patients in group I ranging from 67 to 78 msec with a mean value of 71msec and a standard deviation of 4.3 and in group II it ranged from60 to 77 msec with a mean value of 70.6 and a standard deviation of 4.06 with a *p value* of 0.64. The difference between both groups showed no statistical significance.

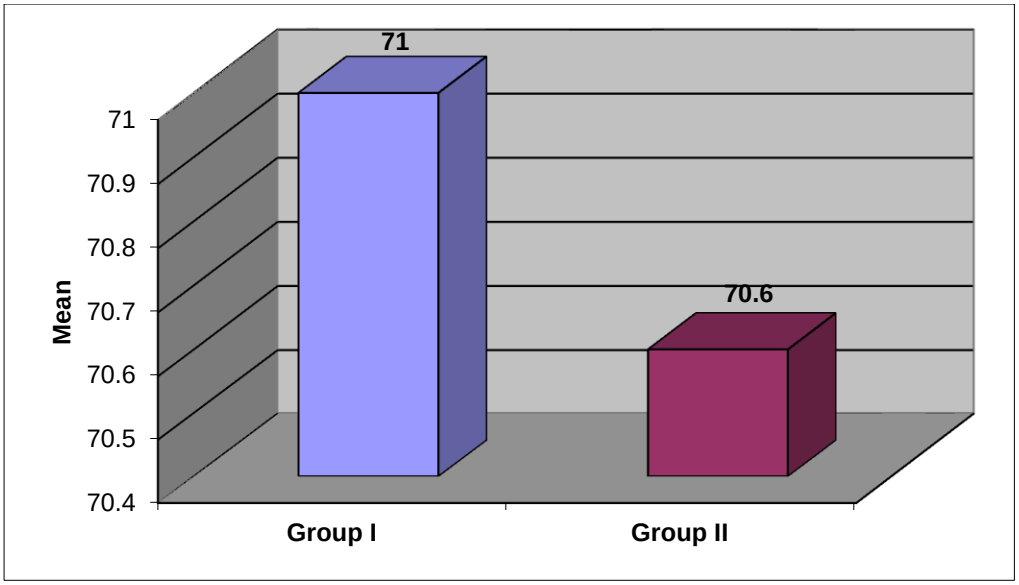

Figure 9: The relation between the mean value of minimum duration of p wave in group I & II.

Table (13): A comparison between the range and mean value of p wave dispersion in the two groups

P wave dispersion(msec)	Group 1	Group 2	P value
Range	19-32	19-28	
Mean value	26	23	0.04
Standard deviation	4.7	4.7	

The calculated p wave dispersion in patients of group I ranged from 19 to 32 msec with a mean value of 26 msec and a standard deviation of 4.7 and that of patients of group 2 ranged from 19 to 28 msec with a mean value of 23 and a standard deviation of 4.7 with a p value of 0.04 .Both the p wave dispersion and the maximum duration of p wave were significantly different between the two groups.

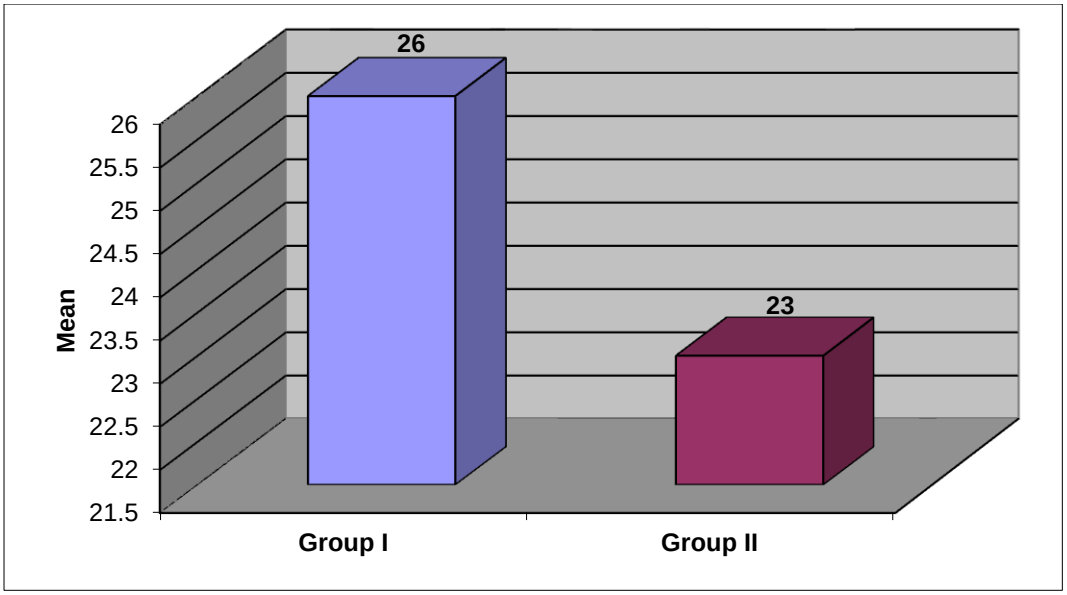

Figure 10 The mean value of p wave dispersion in group I & II

Table (14): A Comparison between maximum, minimum p wave duration and p wave dispersion in the two groups.

	Group 1	**Group 2**	**P value**
max p wave	97.7 msec	94 msec	0.022
Min p wave	71 msec	70.6 msec	0.64
P wave disp.	26 msec	23 msec	0.04

The mean value for the maximum p wave duration in group I was 97.7 ms and in group II was 94 msec.

Table (15): Data of the preoperative echocardiography of patients in group I & II.

Variable	Group 1	Group 2	P value
LVEDd	4.97	5.2	0.52
LVEsd	3.32	3.46	0.94
IVS	0.96	0.875	0.305
Pw	1.030	0.83	0.129
FS	28.5	33.9	0.252
EF	59.6	62.25	0.415
LAD	3.63	3.475	0.225
LAVOL	60.4	53.6	0.139

There was no statistically significant difference in the preoperative echocardiographic data between patients in group I and group II.

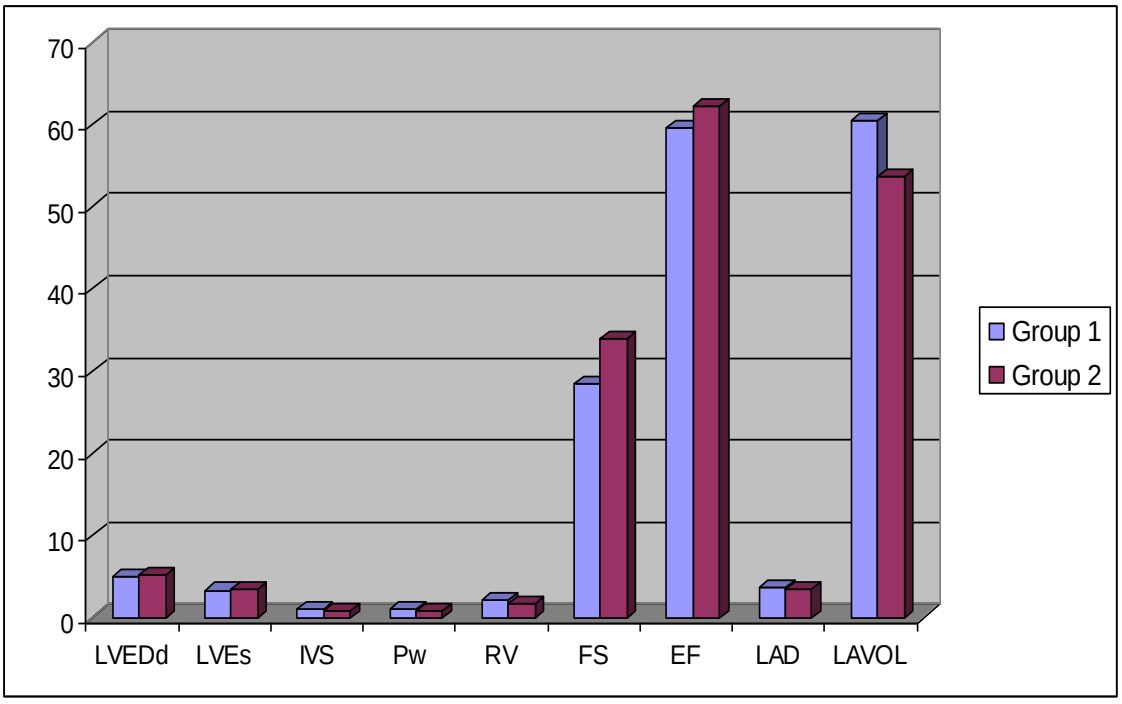

Figure 11: The preoperative echocardiographic data in the patients of group I & II.

Atrial electromechanical interval

- Preoperative Tissue Doppler was done to all patients included in the study

Table (16): comparison between group 1 and group 2 in values of AEMI calculated by TDI

AEMI	*Group 1*	*Group 2*	*P value*
Max value	145	140	
Min value	125	72	
Mean value	136.1	93.7	0.001
Standard deviation	5.66	19.1	

- . It was found that the mean value of the AEMI in group I was 136.1 msec with a standard deviation of 5.66 and in group II was 93.7 msec with a standard deviation of 19.1.
- The calculated p value for these results was0.001 indicating that the AEMI is significantly different between both groups and could be used as strong predictor of post operative AF.

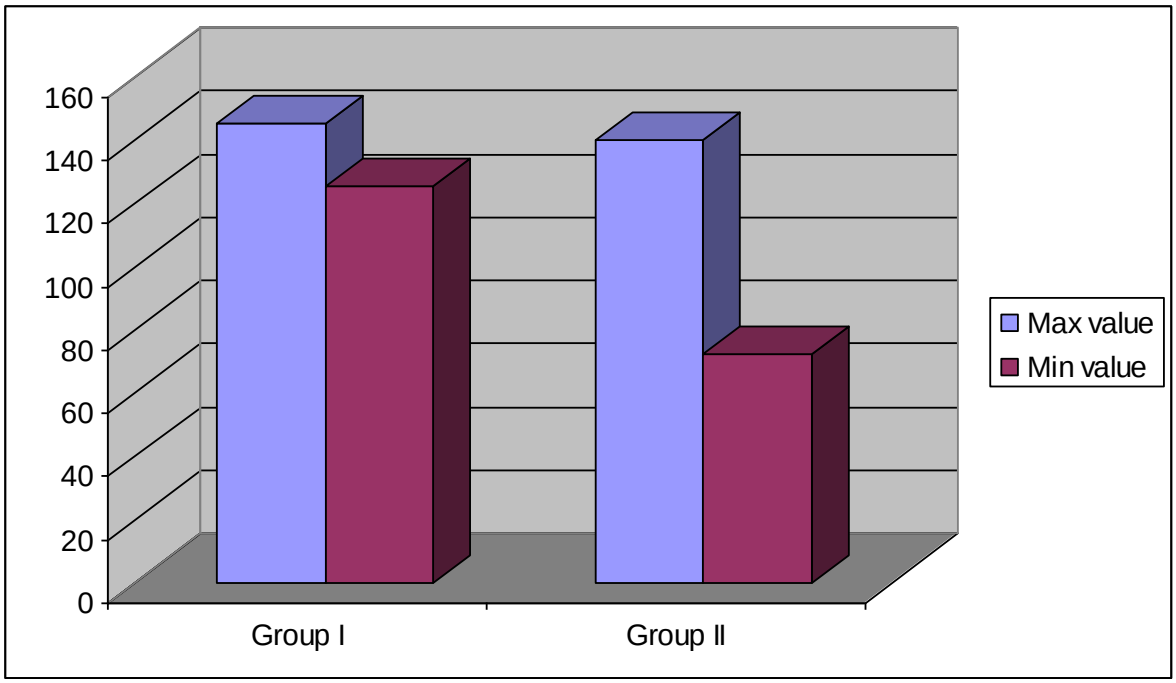

Figure (12): Comparison between the maximum and minimum values of the AEMI in group I & II.

- **Using the Recover- operator –characteristic analysis**

It was found that the best cut of limit of the AEMI done to patients before the CABG operation as a predictor of post operative AF was 120 milliseconds which achieves 100% sensitivity and 99% specificity.

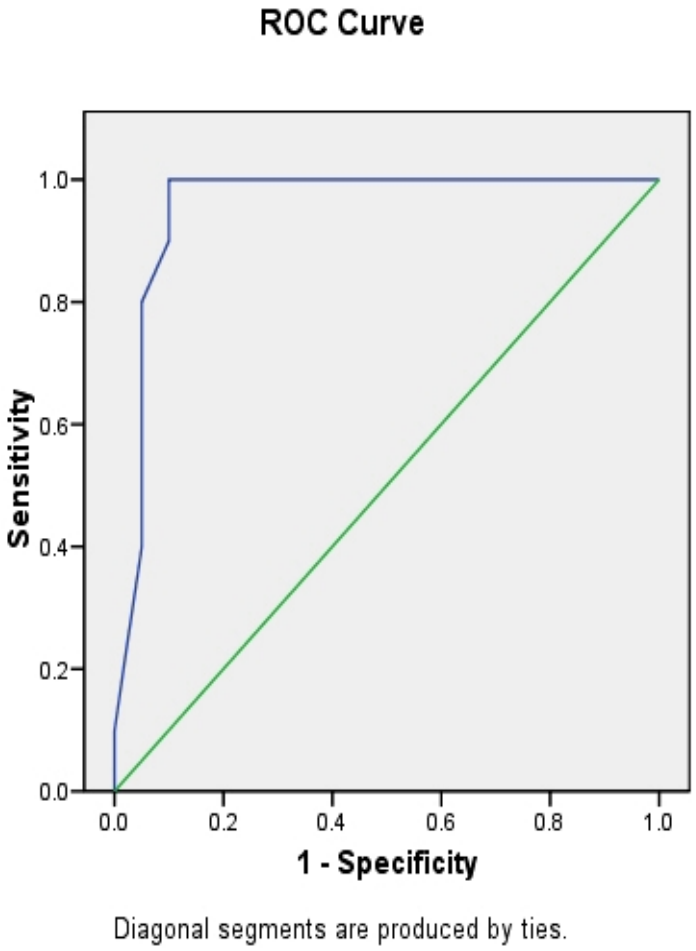

Figure (13): showing ROC curve for AEMI

- So patients with AEMI more than 120 milliseconds is highly susceptible for the occurrence of post operative AF with a sensitivity of 100% and specificity of 99%.
- Also from the previous curve it was found that the area under the curve was.955 with an asymptomatic 95% confidence interval of0.87 as a lower bound and 1.032 as an upper bound indicating that the AEMI is strongly significant in the prediction of post operative AF.