IV

RESULTS

RESULTS

I- CLINICAL, BIOCHEMICAL, RADIOLOGIC AND ECG RESULTS:

The relevant clinical characteristics of the patients are shown in tables (IV - VI). All patients had periorbital edema, whereas a variable percent had pretibial edema (33.3 %) in G1, (65.2%) in G2 and (83.3 %) in G3. Basal rales and gallop rhythm were observed only among G3, in (100%) of patients. Congested neck veins were observed in (33.3%), (34.7%) and (33.3%) of patients in G1, G2 and G3. Fig (9) shows percent distribution of the three patients groups. It is shown that G1 represents 42 % of cases, G2 46 % and G3 12%. While 65% of male patients belong to G2, 53.3% of female patients belong to G1 (fig.10).

Table (VII) shows of heart rate, respiratory rate, systolic and diastolic blood pressures. No significant difference was noticed between the three groups as regards the HR, while RR was significantly increased in G3 (mean = 36.1 c/min) compared with either G1 (mean = 21.9 c/min) or G2 (mean = 23.4 c/min) ($P > 0.001$). The SBP was significantly increased in both G2 (mean= 132.6 mmHg) and G 3 (mean= 134.1 mmHg) compared with G1 (mean= 100.2 mmHg) ($P<0.001$). The DBP was significantly increased in both G2 (mean= 91.3 mmHg) and G3 (mean = 93.1mmHg) compared with G1(mean =66.6mmHg) ($p<0.001$),however no signifcant difference was noted between G2 and G 3 ($P>0.05$) as regarded SBP and DBP.

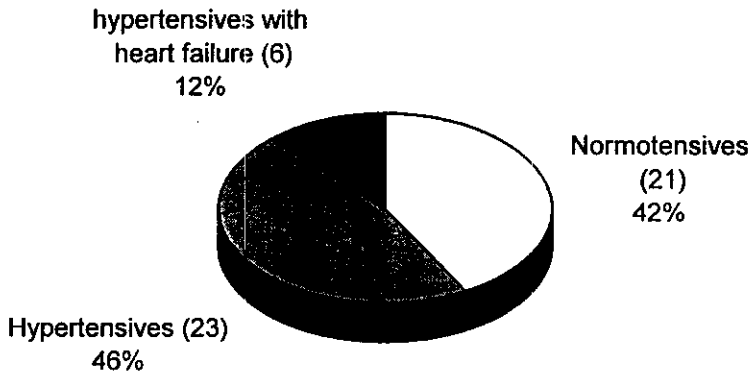


Figure (9) : Distribution of the studied cases according to the presence of hypertension ± heart failure.

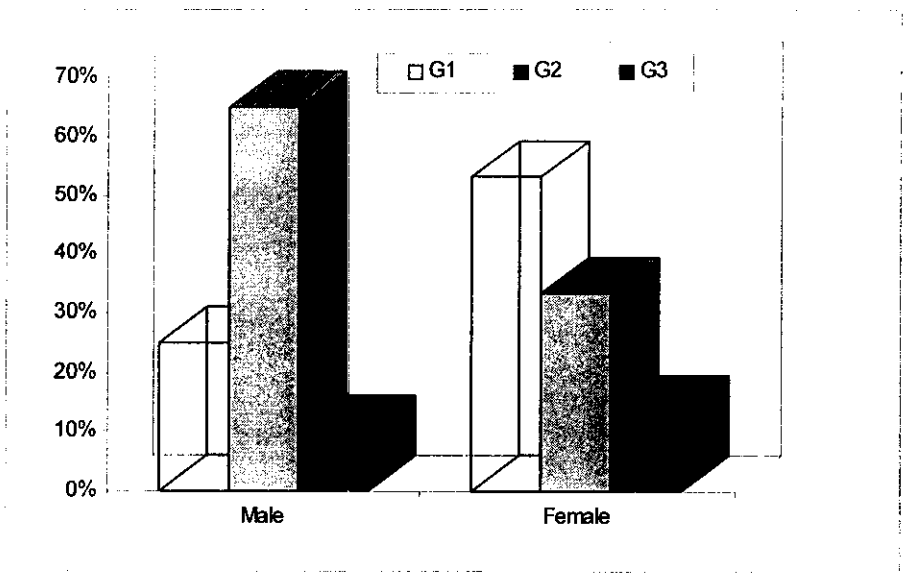


Figure (10) : Distribution of the three patients groups among both sexes.

Table (IV): Clinical characteristics in group One.

Ser No	Sex	Age ys.	HSI	Edema		BR	Gallop	CNV	HR (b/m)	RR (c/m)	Blood pressure		Case No
				PO	PT						S	D	
1	F	3.5	I	+	-	-	-	-	99	20	100	70	1
2	F	7	P	+	-	-	-	+	70	18	120	80	2
3	F	5	P	+	-	-	-	-	106	23	110	70	6
4	F	5	I	+	-	-	-	-	88	21	90	60	7
5	F	4	P	+	+	-	-	-	90	24	100	70	8
6	F	5.5	P	+	-	-	-	+	105	20	120	70	11
7	M	5	P	+	-	-	-	-	80	18	90	60	13
8	F	3.5	P	+	+	-	-	+	100	19	110	70	14
9	M	5	P	+	-	-	-	-	120	24	110	80	17
10	F	5	P	+	+	-	-	+	85	26	90	60	18
11	F	3	I	+	-	-	-	-	88	28	100	65	23
12	F	7	P	+	+	-	-	-	80	21	100	70	24
13	M	3	P	+	-	-	-	+	102	19	95	60	33
14	F	6	P	+	-	-	-	+	101	25	90	60	34
15	F	5.5	P	+	-	-	-	-	100	18	100	70	35
16	F	4	P	+	-	-	-	-	103	20	100	70	36
17	F	4	P	+	-	-	-	-	97	19	110	70	40
18	F	5	P	+	+	-	-	+	77	18	90	60	42
19	M	2.5	P	+	-	-	-	-	102	21	70	50	46
20	M	6	P	+	+	-	-	-	89	24	90	60	48
21	F	5	P	+	+	-	-	-	82	22	100	70	50
Mean		4.6							93.1	21.9	100.2	66.6	
± SD		1.3							12.3	4.3	13.6	8.4	

Abb.

HSI= Histroy of streptococcal infection, P= Pharyngitis,

I= Impetigo, PO = Periorbital, PT = Pretibial,

BR= Basal rales, CNV= Congested neck veins,

HR= Heart rate, RR= Respiratory rate S = Systolic,

D= Diastolic, + = Present, – = Absent

Table (V) Clinical characteristics in Group Two.

Ser No	Sex	Age ys.	HSI	Edema		BR	Gallop	CNV	HR (b/m)	RR (c/m)	Blood pressure		Case No
				PO	PT						S	D	
1	F	8	P	+	+	..	-	+	85	24	130	90	3
2	F	4	P	+	+	..	-	-	106	22	130	85	4
3	F	4	P	+	-	..	-	-	80	22	130	90	5
4	M	6	P	+	+	..	-	-	80	30	140	100	9
5	F	12.5	P	+	+	-	-	+	95	20	160	105	10
6	M	3	I	+	+	-	-	+	108	24	140	100	12
7	M	4	P	+	+	-	-	-	110	26	130	90	15
8	F	5	P	+	+	-	-	-	82	20	130	90	16
9	M	10	P	+	-	-	-	-	90	24	140	90	19
10	F	5	I	+	-	-	-	+	98	21	130	90	20
11	M	5.5	P	+	-	-	-	-	93	25	130	90	22
12	M	4	P	+	+	-	-	-	120	24	120	85	25
13	F	2.5	I	+	-	-	-	-	130	40	130	100	27
14	M	3.5	P	+	+	-	-	+	100	20	130	85	29
15	M	4	P	+	+	-	-	+	96	21	140	100	32
16	M	4	P	+	-	-	-	-	120	18	140	90	37
17	M	3	P	+	-	-	-	-	110	20	130	85	38
18	F	10	I	+	+	-	-	-	96	22	140	100	39
19	M	4	P	+	+	-	-	-	94	18	130	85	41
20	M	3.5	P	+	+	-	-	+	85	24	140	100	43
21	M	8	P	+	+	-	-	+	98	28	130	95	45
22	F	8	P	+	-	-	-	-	110	22	130	95	47
23	F	5	I	+	+	-	-	-	82	20	130	85	49
Mean		5.4							99.1	23.4	132.6	91.3	
± SD		2.6							13.2	4.6	10.5	8.2	

Table (VI): Clinical characteristics in group Three.

Ser No	Sex	Age ys.	HSI	Edema		BR	Gallop	CNV	HR (b/m)	RR (c/m)	Blood pressure		Case No
				PO	PT						S	D	
1	M	4	I	+	+	+	+	+	85	36	140	110	21
2	M	3.5	P	+	+	+	+	+	100	34	130	90	26
3	F	6	P	+	+	+	+	-	100	42	140	90	28
4	F	4	P	+	+	+	+	-	84	38	130	90	30
5	F	2.5	P	+	-	+	+	-	88	33	125	80	31
6	M	6	P	+	+	+	+	-	80	29	140	100	44
Mean		4.3							89.5	36.1	134.1	93.1	
± SD		1.4							8.5	4.2	6.2	10.3	

Table (VII): Comparison of heart rate, respiratory rate, systolic and diastolic blood pressure between the three patient groups.

Patient groups		HR (b/m)	RR (c/m)	SBP (mmHg)	DBP (mmHg)
G1	Mean	93.19	21.9	100.24	66.67
	± SD	12.31	4.31	13.65	8.42
G2	Mean	99.17	23.43	132.61	91.30
	± SD	13.2	4.65	10.64	8.29
G3	Mean	89.5	36.17	134.1	93.1
	± SD	8.53	4.22	6.26	10.33
F value		2.07	24.66***	30.25***	29.77***
LSD (P<0.05)		- -	1,3 - 2,3	1,2 - 1,3	1,2 - 1,3

***= P<0.001

Abb

Group 1 : (normotensives),
Group 2 : (hypertensives),
Group 3 : (hypertensives with heart failure),
LSD : Least significant difference.

The relevant biochemical, radiologic and electrocardio- graphic characteristics of patients in the acute phase (initial) and 2 weeks after (recovery) are shown in tables (VIII-X) and figs.(11-18). The radiologic changes seen were increased cardiothoracic ratio that reverted to normal with recovery (< 50%) in both G1 and G2, while still increased in G3 (mean=51.2%). Different degrees of pulmonary venous congestion were seen in most patients initially, with pulmonary edema (grade III PVC) observed only in G3 (50 %) (Fig.15). These changes returned to normal in recovery roentgenograms (Figs. 12, 14, 16). The relevant ECG characteristic observed in some patients were T1 abnormalities (inverted or flat) on initial evaluation, which also returned upright on recovery evaluation (Figs. 17-18). It was found in G1 (14.2%), G2 (21.7 %) and in G3 (33.3%). Other ECG parameters showed no significant difference in comparing G1,G2 and G3(appendix A).

Table (XI) shows comparison of cardiothoraic ratio (initial and recovery), serum urea and creatinine between the three patient groups. Only serum creatinine that was significantly increased in both G2 (mean: 1.14 mg/dl) and G3 (mean: 1.33mg/dl) compared with G1 (mean: 0.75mg/dl) ($P<0.05$), while no signifcant difference was noted between G2 and G3 in serum creatinine levels ($P>0.05$). The initial and recovery weight of patients were used to calculate the percent weight change which shows no significant difference between the three patients groups ($P>0.05$).

Table (VIII): Weight and some biochemical, radiologic and ECG findings in group one.

Ser No.	Weight (kgs) I	Weight (kgs) R	Serum Urea (mg/dl)	Serum Creatinine (mg/dl)	CTR % I	CTR % R	PVC grade	ECG T_1 abn.	Case No.
1	15	13.5	50	1.6	53	50	++	-	1
2	30	25.5	28	0.4	55	48	++	+	2
3	16	13.5	62	1.0	58	49	++	-	6
4	19.5	18.5	24	0.3	62	56	+	-	7
5	16.5	14	56	1.5	60	55	+	-	8
6	15	14	26	0.4	56	50	+	-	11
7	17	15	38	0.9	50	48	+	+	13
8	16.5	15	20	0.4	50	49	-	-	14
9	21	20	23	0.5	51	50	++	-	17
10	18	16.5	24	0.7	56	55	++	-	18
11	14.5	13	39	0.8	56	52	++	+	23
12	19	18	127	0.5	50	48	+	-	24
13	16	14	42	1.0	52	50	-	-	33
14	20	19	30	0.7	51	48	+	-	34
15	19.5	18	15	0.2	50	48	-	-	35
16	19	...	56	1.1	52	...	+	-	36
17	15	...	51	1.1	55	...	-	-	40
18	19	...	33	0.7	50	...	-	-	42
19	12.5	...	38	0.9	56	...	+	-	46
20	18	...	32	0.5	51	...	+	-	48
21	18	...	44	1.0	58	...	+	-	50
Mean	17.6	16.6	40.1	0.75	54	49.6			
± SD	3.6	3.4	23.3	0.34	3.6	1.7			

Abb

I= initial, **R**=recovery, **CTR**= Cardiothoric ratio,
PVC= Pulmonary vascular congestion, **-**= absent,
+= hilar, **++**= redistribution. ... = not available

Table (IX) Weight and some biochemical, radiologic and ECG findings in group Two:

Ser No.	Weight (kgs) I	Weight (kgs) R	Serum Urea (mg/dl)	Serum Creatinine (mg/dl)	CTR % I	CTR % R	PVC grade	ECG T_1 abn.	Case No.
1	30	22	67	1.8	47	46	+	-	3
2	17	14.5	32	1.2	56	52	+	-	4
3	19	17	71	1.3	58	50	+	+	5
4	19	17	47	1.0	51	50	++	-	9
5	38.5	35	31	0.6	48	46	+	+	10
6	16	14	128	2.2	50	48	+	-	12
7	17.5	15.5	95	2.5	57	53	++	-	15
8	18	18	21	0.6	53	50	+	+	16
9	35.5	35	56	1.0	53	50	++	-	19
10	15.5	15	99	1.2	54	51	+	-	20
11	19	18	87	1.2	50	48	++	+	22
12	16	14	28	0.8	55	53	++	-	25
13	12	12	46	0.8	53	52	+	-	27
14	14	13	49	1.1	56	55	+	-	29
15	19	18	40	0.8	53	...	+	-	32
16	16.5	...	38	0.8	51	...	+	-	37
17	13.5	...	31	0.5	58	...	+	-	38
18	23.5	...	32	1.0	59	...	++	-	39
19	16	...	22	0.3	59	...	+	-	41
20	17	...	41	0.9	59	...	++	+	43
21	24	...	22	0.8	58	...	++	-	45
22	21	...	70	2.3	52	...	+	-	47
23	12.5	...	42	1.0	55	...	-	-	49
Mean	19.8		52.7		53.5	50.0			
± SD	6.5	6.9	28.2	0.5	3.4	2.5			

Table (X) Weight and some biochemical, radiologic and ECG findings in Group Three:

Ser No.	Weight (kgs) I	Weight (kgs) R	Serum Urea (mg/dl)	Serum Creatinine (mg/dl)	CTR % I	CTR % R	PVC grade	ECG T_1 abn.	Case No.
1	16.5	15.5	37	0.8	56	51	+++	-	21
2	17.5	16.5	157	2.8	53	47	+++	+	26
3	19	16.5	88	1.9	53	52	++	-	28
4	18	17	59	1.0	60	55	+++	-	30
5	11	10	55	1.0	55	51	++	+	31
6	20	..	30	0.5	64	..	++	-	44
Mean	17	15	71	1.3	55.5	51.2			
± SD	3.1	2.8	46.7	0.8	3.3	3.3			

PVC +++ = Pulmonary edema

Table (XI) Comparison of percent weight change, CTR, serum creatinine and urea between the three patient groups.

Patient groups		% weight change	CTR % I	CTR % R	Serum Creatinine (mg/dl)	Serum Urea (mg/dl)
G1	Mean	9.30	54.0	49.64	0.75	40.19
	± SD	3.58	3.61	1.75	0.34	23.39
G2	Mean	9.98	53.5	50.0	1.14	52.57
	± SD	6.5	3.48	2.54	0.58	28.24
G3	Mean	8.52	55.5	51.25	1.33	71.0
	± SD	3.12	3.32	3.3	0.86	46.74
F value		0.17	0.52	0.67	4.32*	2.86
LSD (P<0.05)		..	..	..	1,2 - 1,3	..

* = P < 0.05

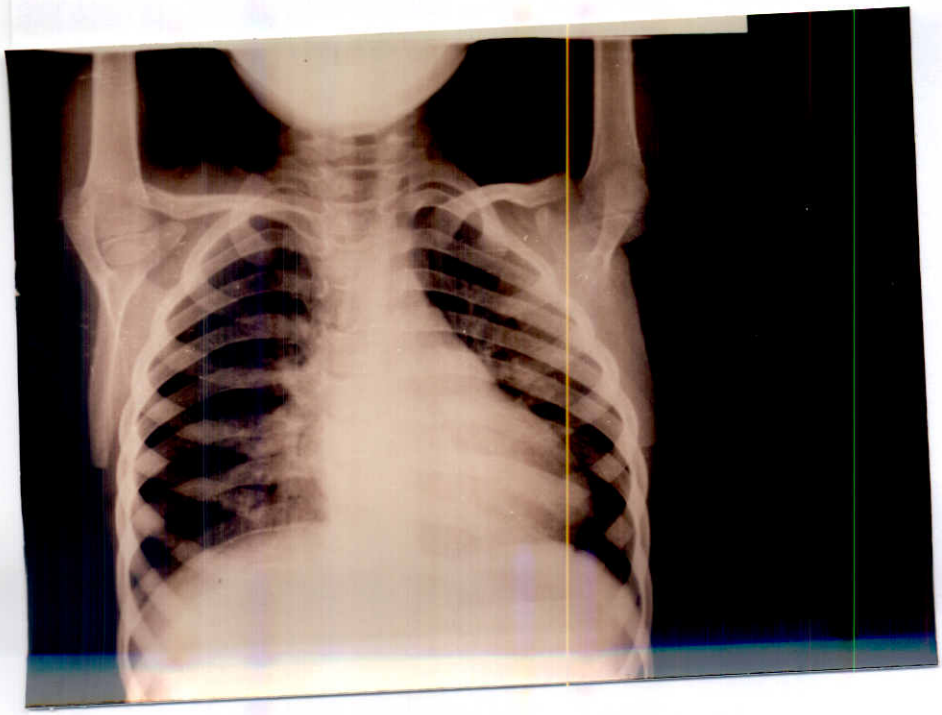
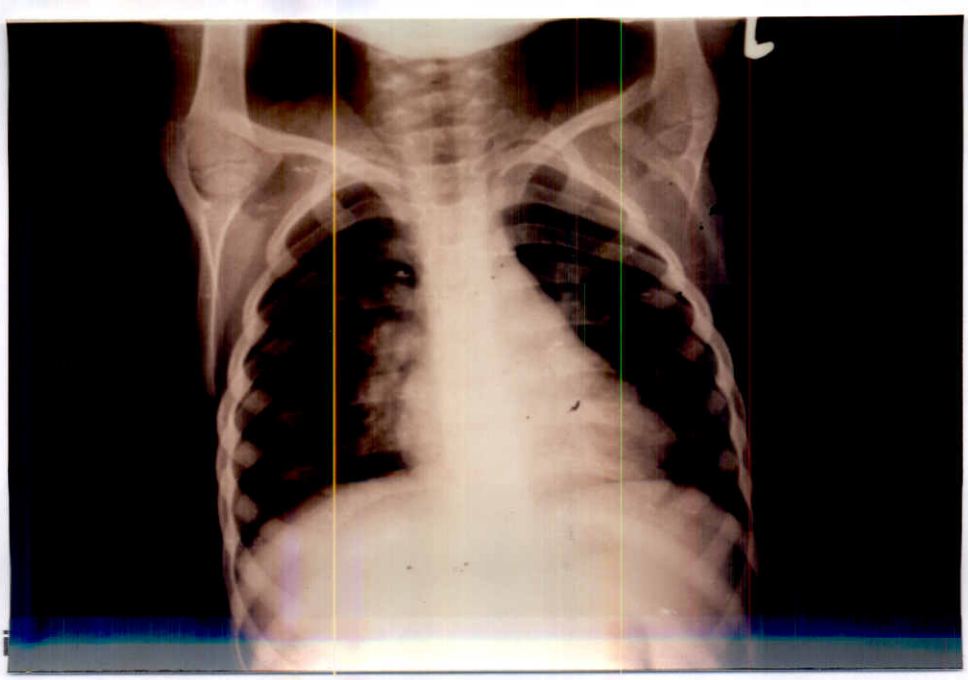


Figure (11). Chest x ray of case no.18, showing cardiomegaly and grade I pulmonary venous congestion.



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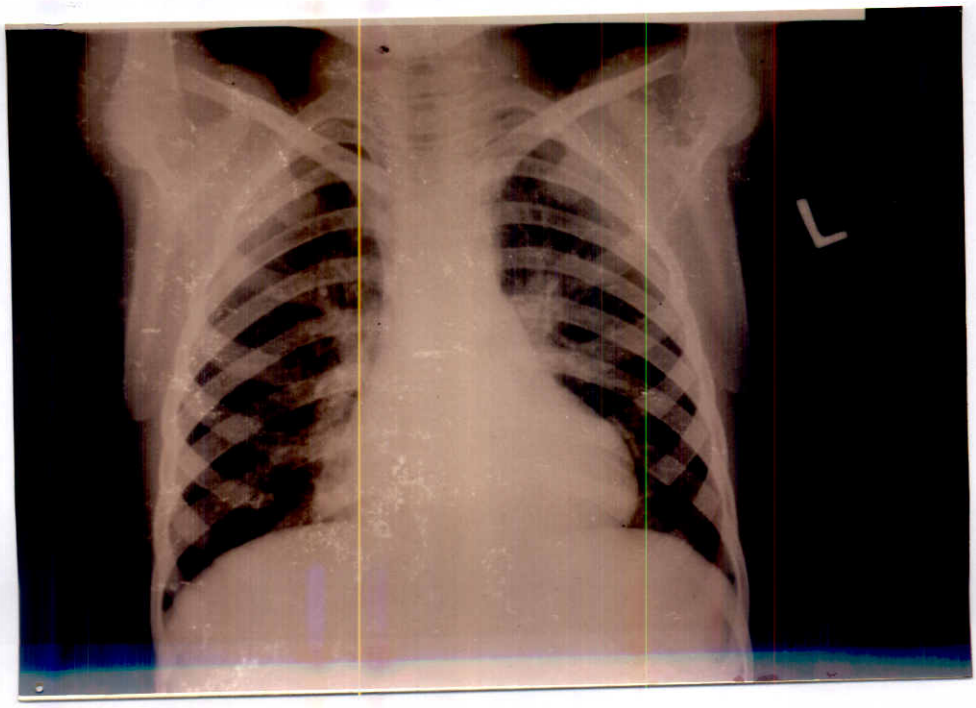
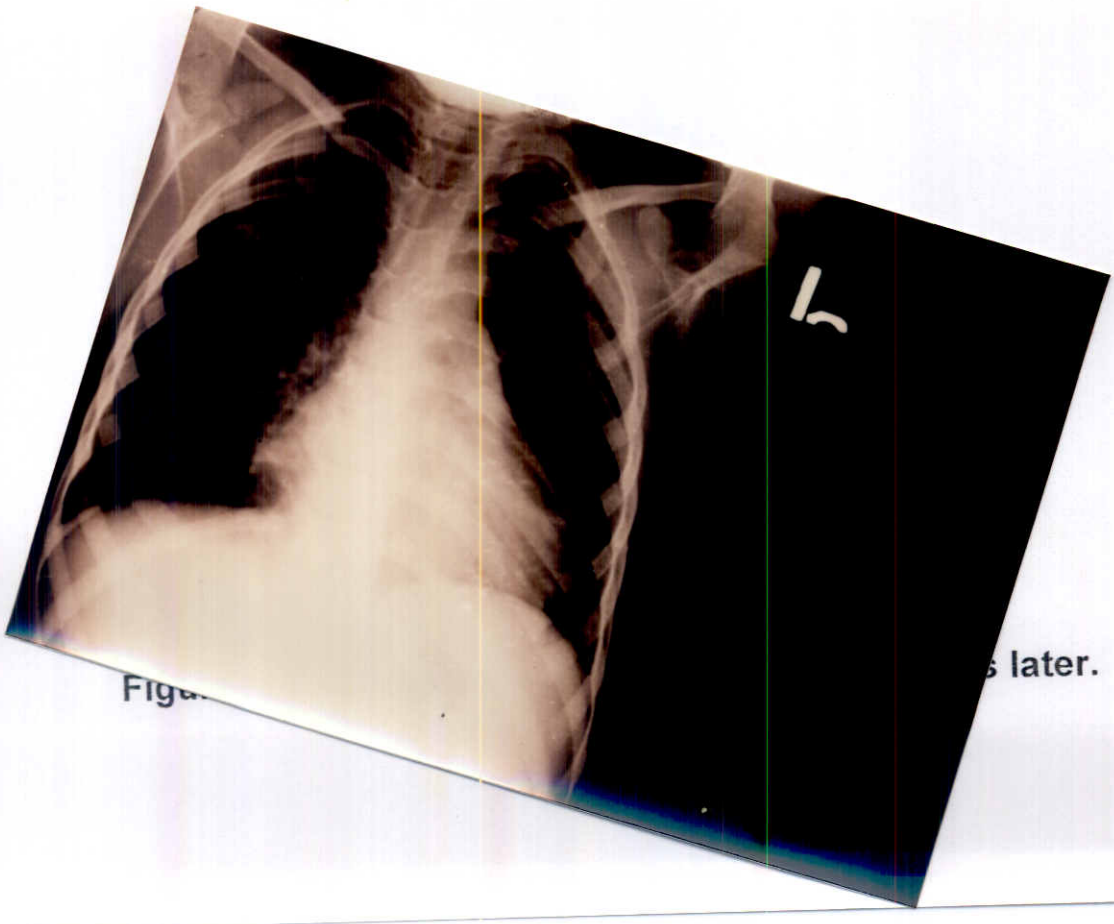


Figure(13). Chest x ray of case no. 44, showing cardiomegaly and grade II pulmonary venous congestion.



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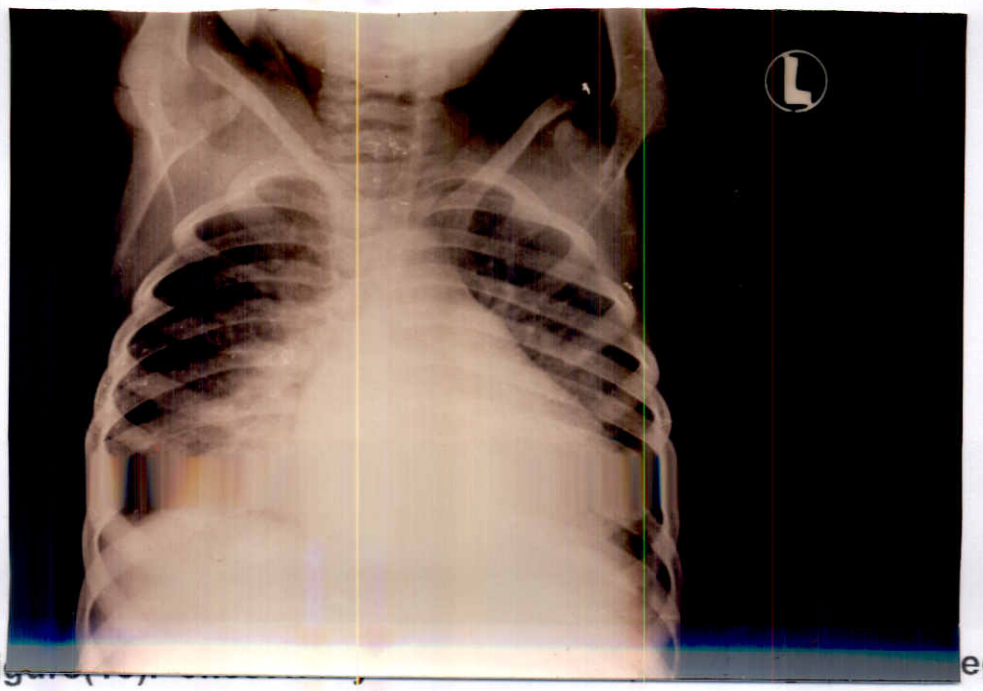


Fi egaly and grade III pulmonary venous congestion (pulmonary edema).

Figure (16). Chest x ray of the same case 2 weeks later.

Figure (17). ECG of case no.5 , showing inverted T waves in lead I which turned upright 2 weeks later.

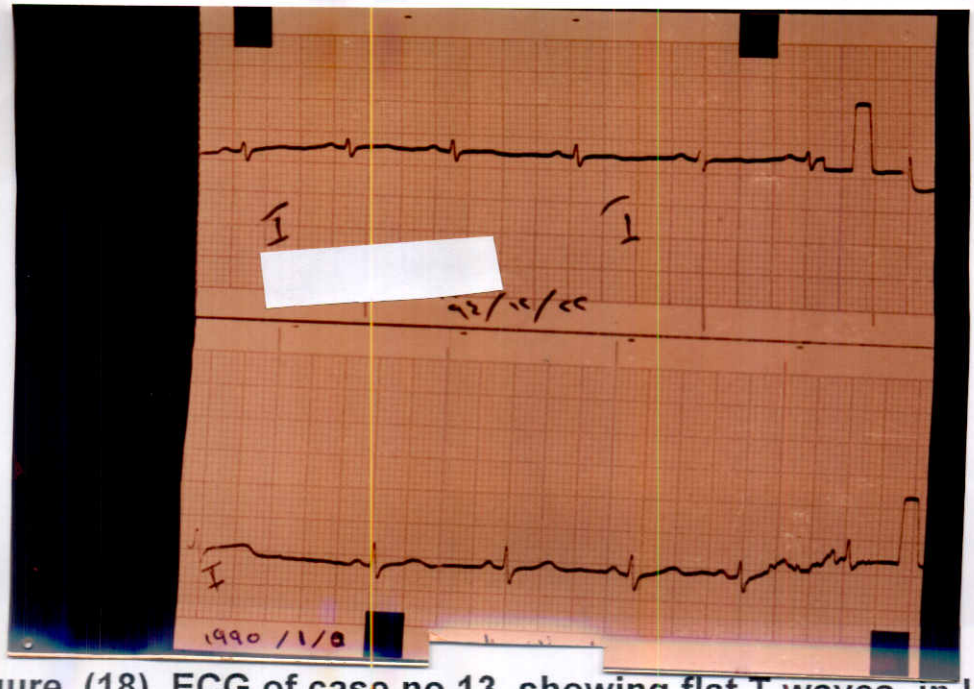


Figure (18). ECG of case no.13, showing flat T waves in lead I which turned upright 2 weeks later.

II - ECHO-DOPPLER RESULTS

The echo-Doppler measurements of patients (initial and recovery) and controls are listed in Appendix (A). No segmental wall motion abnormality was visualized in patients either on initial or recovery assessments. Moreover, no echofree space behind the left ventricular posterior wall, in either M mode or 2D- echo., was visualized in any one of our studied patients. By M-mode echocardiography, the assessment of both the IVS and left ventricular PW revealed no hyperechogenic areas, either on initial or recovery examinations.

Echo-Doppler measurements and parameters were tabulated as follows: M mode measurements, 2D-echo. measurements, LV systolic function, LV diastolic function, RV systolic function and RV diastolic function. However, other Echo-Doppler measurements and parameters were not included in the following tables, as they show insignificant difference when compared in different patient groups. (Appendix). Figs.(19-26) illustrate some M- mode and 2D -echocardiographic measurements of patients.

Table (XII) shows comparison of cardiac internal dimensions by M-mode echocardiography between patients in one group on initial exmaination (PG-I) and control group.Both IVS-D and IVS-S were significantly increased in PG-I (mean = 10.7mm and 13.1mm respectively)compared with controls (means= 8.9mm and 11.8

respectively) (P< 0.001 and P< 0.05 respectively). Both PW-D and PW-S were significantly increased in PG-I (means = 9.0 mm and 11.7 mm respectively) compared with controls (means = 8.1mm and 10.7 mm respectively) (P< 0.05). LVM was significantly increased in PG-I (mean = 91.9gm), compared with controls (mean = 70.7gm) (P< 0.001). LA dimension was also significantly increased in PG-I (mean = 37.6mm) compared with controls (mean= 30.5mm) (P<0.001). LV-D-D, LV-D-V, LV-S-D, LV-S-V, AO and RV-D were not significantly different between PG-I and controls (P > 0.05).

Table (XIII) shows comparison of cardiac internal dimensions by 2D-echo. between PG-I and controls. While AO-D and PV-D were not significantly different between PG-I and controls, yet, both TV-D and MV-D were siginificantly increased in PG-I (means = 29.4mm and 20.6mm respectively) compared with controls (means = 26.3mm and 18.8mm respectively) (P< 0.001 and P< 0.005 respectively).Right atrial dimensions (RA-LA,RA-SA and RA-AR) were significantly increased in PG-I (means = 44.8mm, 38.5mm and 10.3 cm^2 respectively) compared with controls (means=41.1mm, 34.9mm and 9.1cm^2 respectively) (P< 0.05, P< 0.05 and P< 0.005 respectively). Left atrial dimensions (LA-LA, LA-SA and LA-AR) were significantly increased in PG-I (means = 45.4mm , 40.1 mm and 11.4 cm^2 respectively) compared with controls (means 40.2 mm, 35.7mm and 9.1cm^2 respectively) (P< 0.005, P<0.05 and P<0.001 respectively). LA/RA ratio was also significantly increased

in PG-I (mean = 1.12) compared with controls (mean = 1.01) ($P< 0.05$). Left atrial volumes (LAV-S and LAV-D) were significantly increased in PG-I (means = 38.0 ml and 21.0 ml respectively) compared with controls (means= 28.6 ml and 17.7 ml respectively)($P<0.001$ and $P<0.005$ respectively). Right ventricular volumes (RVV-D and RVV-S) were significantly incraesed in PG-I (means = 6.1 ml and 14.3 ml respectively) compared with controls (means 4.8 ml and 10.4 ml respectively) ($P< 0.05$ and $P< 0.001$ respectively). Lastly, IVC-MIN was only significantly increased in PG-I (mean = 7.8 mm) compared with controls (mean = 6.0mm)($P<0.005$), while IVC-MAX was not significantly different between the two groups.

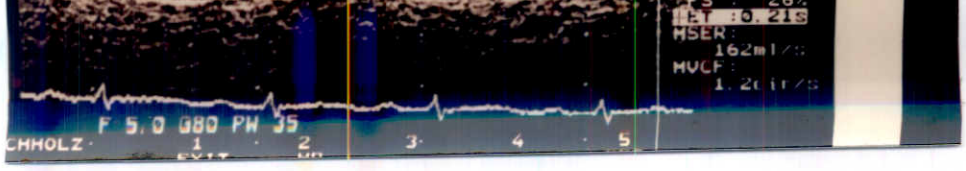
Table (XIV) shows comparison of left ventricular systolic functional parameters by echo-Doppler. between PG-I and controls. Only AO-NPKV and AO-MAC were significantly increased in PG-I (means = 0.34 m/s and 14.4 m/s^2 respectively) compared with controls (means = 0.29 m/s and 10.8 m/s^2 respectively) ($P<0.005$ and $P<0.001$ respectively), while other systolic indices (FE, FS, SVI, COP, MVCFS, MSER, AO-SV, AO-PMR and AO-ACR)were not significantly different between the two groups.

Table(XV) shows comparison of left ventricular diastolic functional parameters by echo-Doppler. between PG-I and controls. Left atrial functional parameters (LA-DIM, LAC-DIM and LA-EF) were significantly increased in PG-I (means=48.8%, 49.8% and 43.3%

respectively) compared with controls (means=40.3%, 40.9% and 37.4% respectively) (P< 0.05).

Some mitral flow indices were significantly increased in PG-I, including MVE-A, MV-VTI-EA and MV-RFI(means= 1.7, 2.6 and 1.6 respectively) compared with controls (means= 1.5, 2.1 and 1.5 respectively) (P<0.05, P<0.005 and P<0.005 respectively). Other diastolic indices were not significantly different between the two groups including IVRT, MV-VTI-E-T, MV-VTI33, and MVE-DT.

Table (XVII) shows comparison of right ventricular systolic and diastolic functional parameters by echo-Doppler between PG-I and controls. Only TAPSE-EF that was significantly decreased in PG-I (mean = 30.9%) compared with controls (mean = 36.4%) (P<0.005). All other systolic indices were not significantly different between the two groups, including RVV-EF, PA-PP-ET, PA-AC-ET, PA-SV, PA-PMR, PA-MAC and PA-ACR. Among the diastolic functional indices, only IVC-CI that was significantly decreased in PG-I (mean =31.2%) compared with controls (mean = 42.8%) (P<0.001),while TVE-A, TV-VTI E-A and TV-VTI 33 were not significantly different between the two groups.



Figure(19). M-mode echocardiogram of case no.30 (hypertensive with heart failure), showing different M- mode measurements.

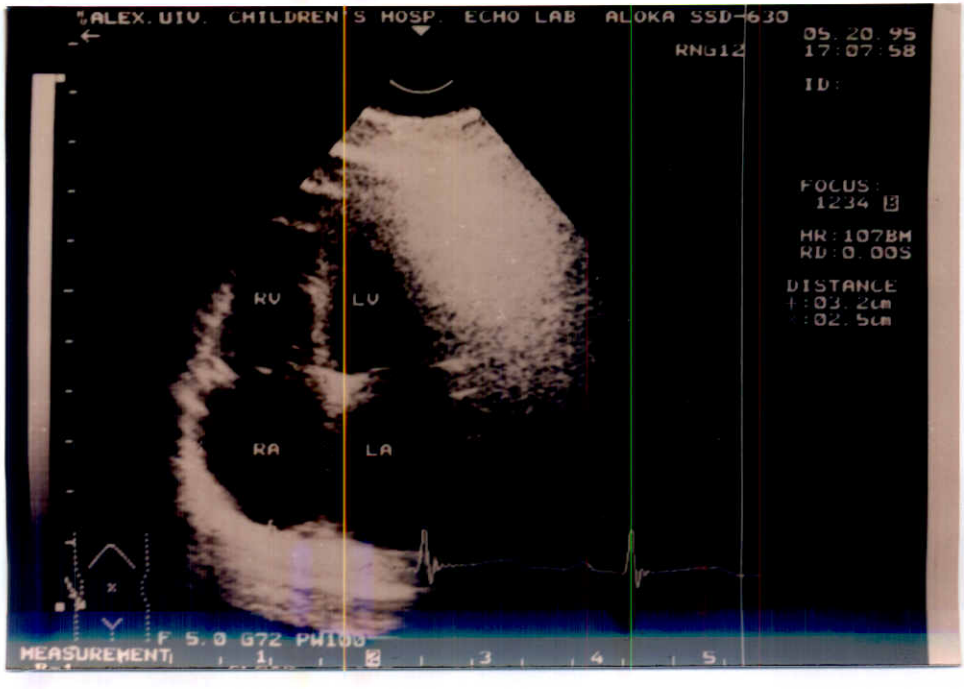


Figure (20). 2D-echocardiogram, apical 4 chamber view of case no. 9, showing enlarged right atrial dimensions including long and short axes at end systole.

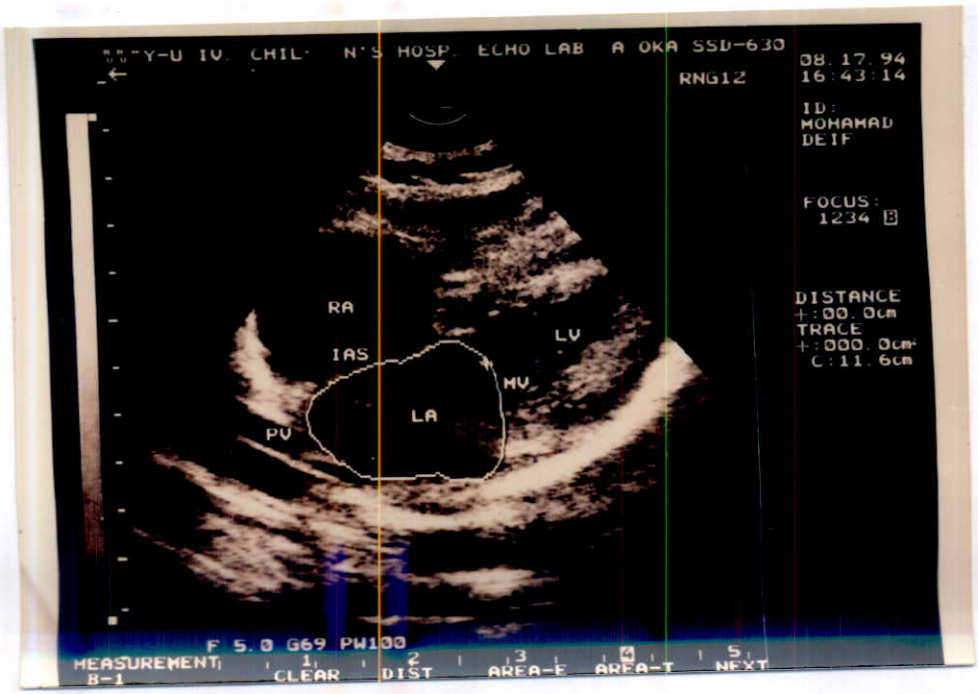


Figure (21). 2D-echocardiogram, subcostal 4 chamber view of case no. 41, showing enlarged left atrial area at end systole.

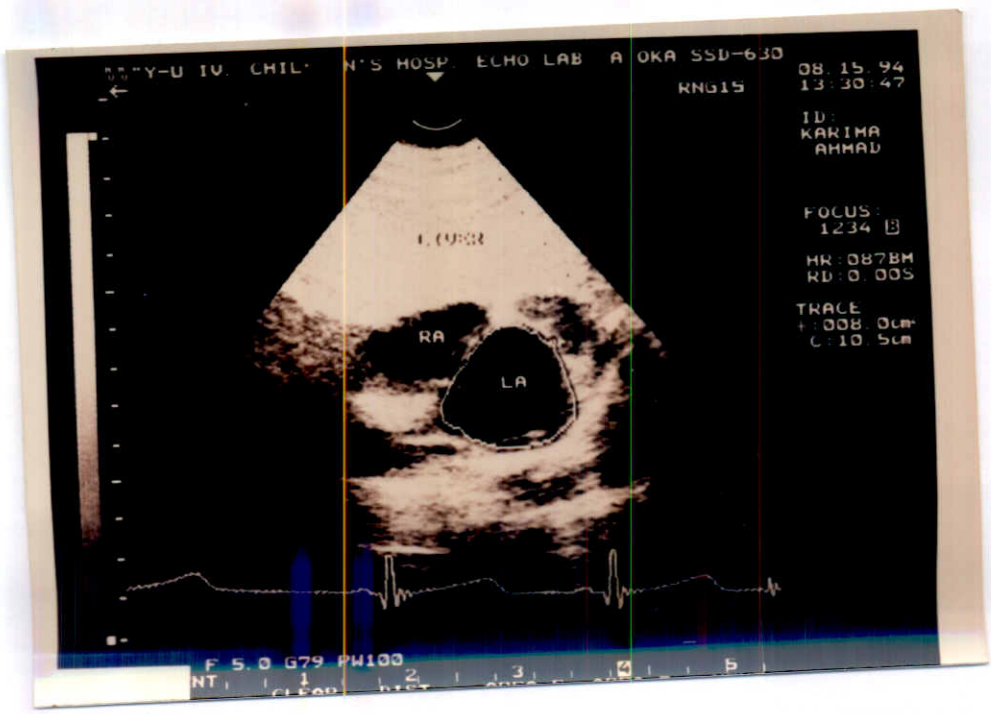


Figure (22). 2D-echocardiogram, subcostal cross sectional view of case no. 1, showing enlarged left atrial area at end systole.

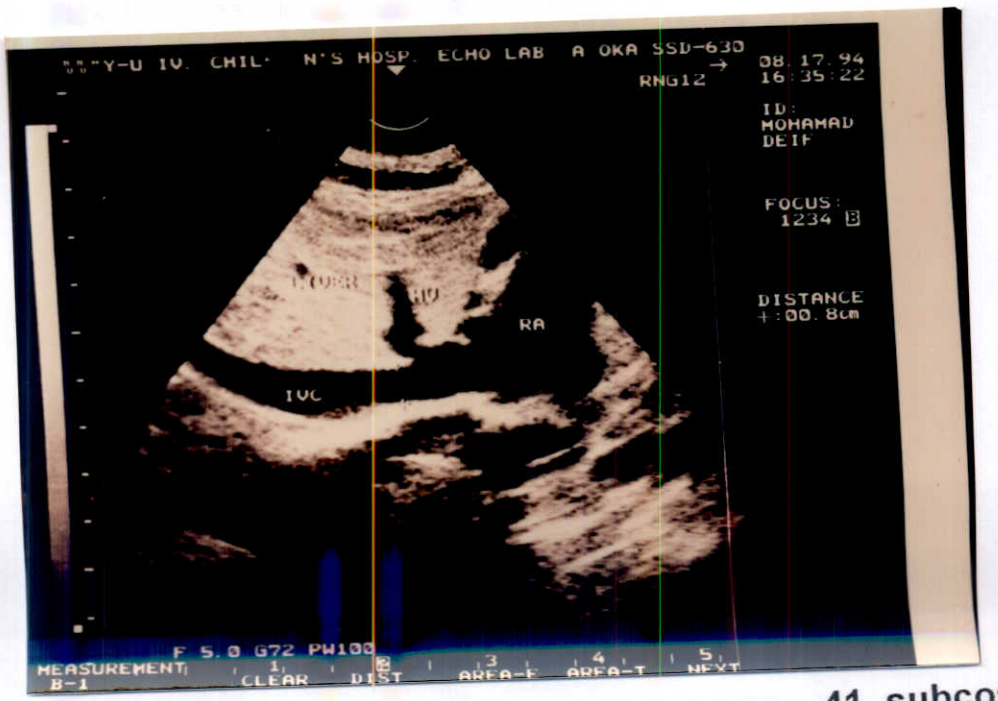
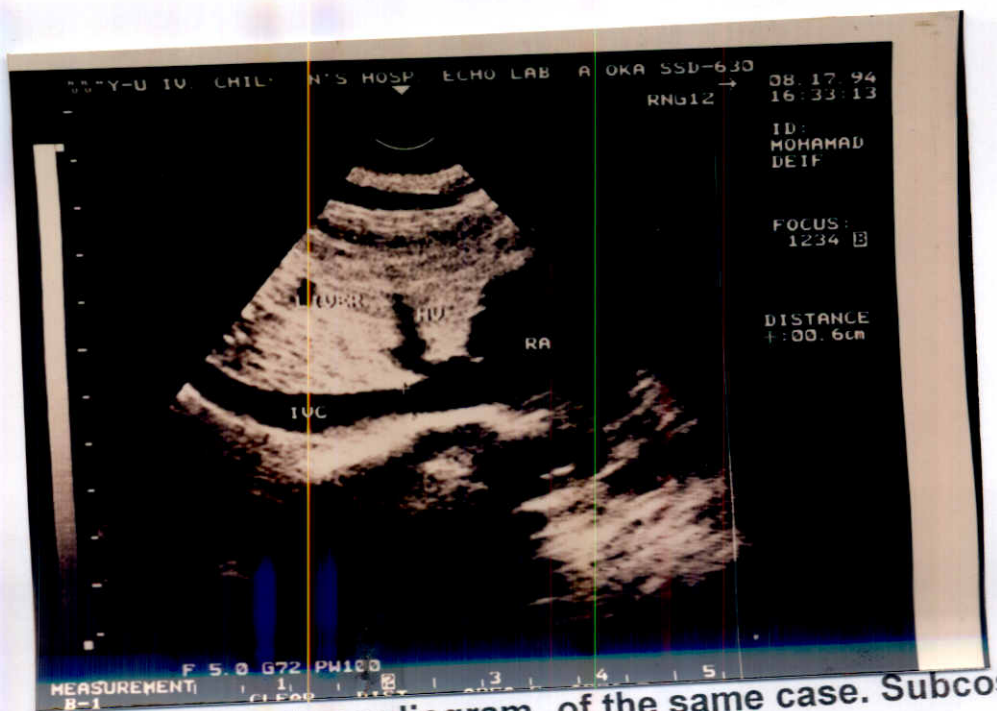


Figure (23). 2D-echocardiogram of case no .41, subcostal view showing enlarged inferior vena cava during expiration.



Figure(24). 2D-echocardiogram of the same case. Subcostal view of the inferior vena cava during inspiration with slight change in diameter.

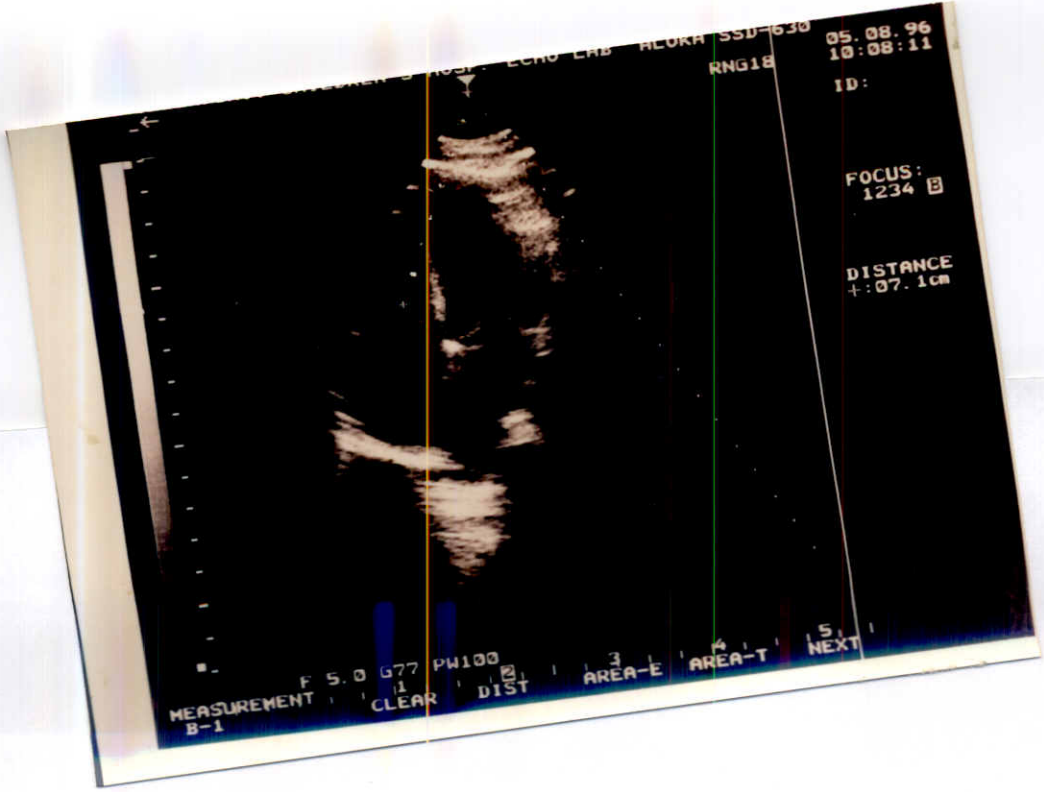


Figure (25). 2D-echocardiogram, apical 4 chamber view showing tricuspid annular plane at end systole.

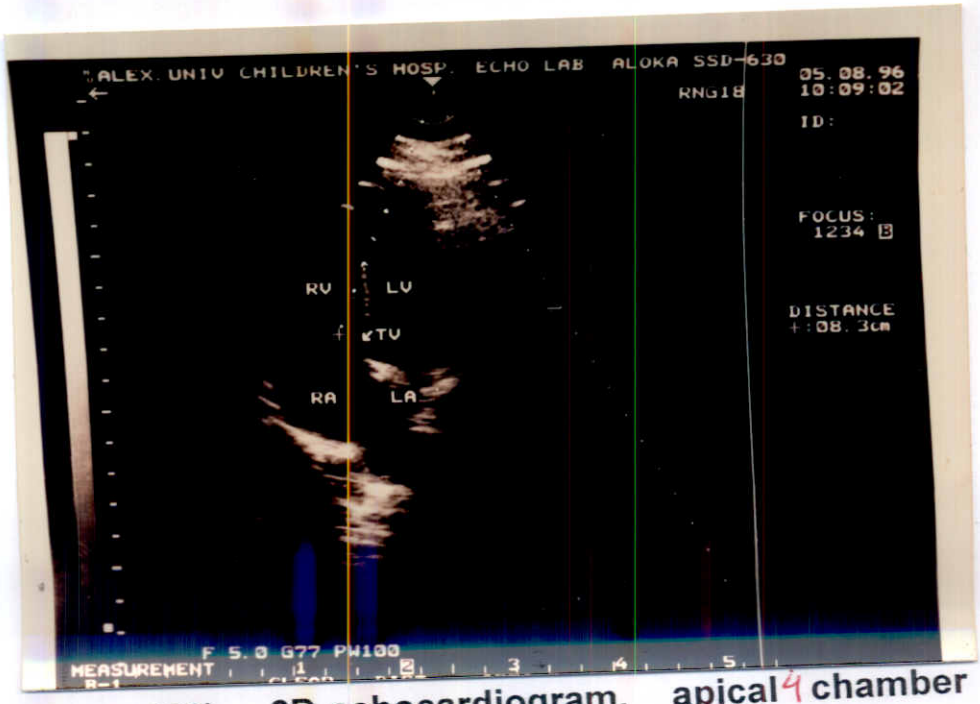


Figure (26). 2D-echocardiogram, apical 4 chamber view

Table (XII) Comparison of cardiac internal dimensions by M-mode echocardiography between PG-I and control group.

Parameter	PG-I		Control		t test
	Mean	± SD	Mean	±SD	
IVS-D(mm)	10.7	2.4	8.9	1.9	3.52***
IVS-S(mm)	13.1	2.6	11.8	2.1	2.27*
PW-D(mm)	9.0	2.1	8.1	1.4	2.05*
PW-S(mm)	11.7	2.1	10.7	2.0	2.08*
LV-D-D(mm)	50.6	7.1	48.2	7.4	1.39
LV-D-V(ml)	73.2	14.9	69.2	15.3	1.15
LV-S-D(mm)	33.3	4.9	31.14	4.9	1.15
LV-S-V(ml)	25.5	6.8	23.1	6.0	1.95
LV M (gm)	91.9	27.1	70.7	18.9	3.77***
AO (mm)	27.8	4.6	26.8	4.2	0.95
LA (mm)	37.6	5.8	30.5	4.8	5.61***
LA/AO	1.37	0.1	1.14	0.1	6.25***
RV-D(mm)	13.9	3.5	13.7	2.4	0.29

Abb :

IVS: interventricular septum D: end diastolic

PW:posterior wall S:end systolic

LVD:left ventricular end diastolic D:dimension

LVS:left ventricular end systolic V:volume

LVM:left ventricular mass

AO:aortic root LA:left atrium

RVD:right ventricular dimension at enddiastole

*P<0.05 **P<0.005 ***P<0.001

Table (XIII) Comparison of cardiac internal dimensions by 2D- echocardiography between PG-I and control group.

Parameter	PG-I		Control		t test
	Mean	± SD	Mean	±SD	
AO-D(mm)	21.3	2.8	21.7	3.6	0.56
PV-D (mm)	21.3	3.1	21.4	4.0	0.15
TV-D (mm)	29.4	4.7	26.3	3.9	3.02***
MV-D(mm)	20.6	2.7	18.8	2.1	3.22**
RA-LA(mm)	44.8	7.1	41.1	6.2	2.35*
RA-SA (mm)	38.5	6.8	34.9	7.3	2.27*
RA-AR(cm^2)	10.3	1.8	9.1	1.5	2.91**
LA-LA (mm)	45.1	7.1	40.2	6.3	3.26**
LA-SA (mm)	40.1	8.7	35.7	4.9	2.57*
LA-AR (cm^2)	11.4	2.5	9.1	1.5	4.49***
LA/RA(area)	1.12	0.2	1.01	0.2	2.27**
LA-V-S(ml)	38.0	8.1	28.6	9.1	4.98***
LA-V-D(ml)	21.0	6.1	17.7	6.0	2.87**
RV-V-D(ml)	6.1	2.4	4.8	1.6	2.56*
RV-V-S(ml)	14.3	4.9	10.4	3.0	3.81***
IVC-MAX(mm)	11.1	2.5	10.5	2.4	1.02
IVC-MIN(mm)	7.8	2.6	6.0	1.6	3.24**

Abb :

AO-D:aortic valve diameter

PV-D:pulmonary valve diameter

TV-D:tricuspid valve diameter , MV-D:mitral valve diameter

RA:right atrium LA:long axis SA:short axis AR:area

LA:left atrium V:volume S:end systolic D:end diastolic

RV: right ventricle IVC: inferior vena cava

MAX:maximum MIN: minimum

*P<0.05 **P<0.005 ***P<0.001

Table (XIV) Comparison of left ventricular systolic functional parameters by echo-Doppler. between PG-I and control group.

Parameter	PG-I		Control		t test
	Mean	± SD	Mean	±SD	
EF(%)	65.1	5.9	66.0	4.3	0.75
FS(%)	34.9	4.5	34.6	2.4	0.30
SVI(ml/b/M)	47.5	11.5	46.2	10.3	0.61
COP(L/m/M)	4.6	1.3	4.3	0.8	0.31
MSER(ml/s)	127.4	36.3	126.3	28.4	0.14
MVCFS(c/s)	1.07	0.1	1.05	0.1	0.30
AO-PP-ET	0.29	0.05	0.30	0.04	0.79
AO-AC-ET	0.32	0.06	0.33	0.04	0.85
AO-NPKV(m/s)	0.34	0.09	0.29	0.05	2.74**
AO-SV(ml/b)	34.0	12.6	30.3	8.1	1.45
AO-PMR	1.5	0.11	1.5	0.09	0.38
AO-MAC(m/s^2)	14.0	4.0	10.8	1.9	4.13***
AO-ACR	0.34	0.04	0.34	0.07	0.08

Abb :

EF:ejection fraction , FS:fractional shortening

SVI:stroke volume index , COP:cardiac output index

MSER : mean systolic ejection rate

MVCFS:mean velocity of circumferential fibre shortening

(corrected), AO-PP-ET:preejection period / ejection time ratio

AO-AC- ET : acceleration time /ejection time ratio

AO-NPKV:normalized peak velocity, AO-MAC:mean acceleration

AO-ACR :acceleration ratio of integrals,

AO-PMR: peak /mean ratio , AO-MAC:mean acceleration

AO-ACR:acceleration ratio of integrals

*P<0.05 **P<0.005 ***P<0.001

Table (XV) Comparison of left ventricular diastolic functional parameters by echo-Doppler. between PG-I and control group.

Parameter	PG-I		Control		t test
	Mean	± SD	Mean	±SD	
IVRT(s)	0.07	0.01	0.08	0.01	0.32
LA-DIM (%)	48.1	14.3	40.3	12.7	2.44*
LA-C - DIM(%)	49.4	13.3	40.9	19.7	2.30*
LAEF(%)	43.3	10.0	37.4	13.5	2.24*
MV E/A	1.7	0.3	1.5	0.2	2.23*
VTI-E/A	2.6	0.9	2.1	0.5	2.82**
VTI-E/T	0.7	0.09	0.70	0.08	0.11
VTI-A/T	0.2	0.07	0.2	0.08	0.99
VTI 33%	0.41	0.06	0.39	0.05	1.11
MV-E-DT(s)	0.10	0.03	0.11	0.02	0.41
MV-RFI	1.6	0.1	1.5	0.2	3.02**

Abb:

IVRT=isovolumic relaxation time
LADIM:left atrial area diminusion by subcosatal 4 chamber view.
LACDIM:left atrial area diminusion by subcostal cross sectional view.
MVE/A : mitral E/A velocity ratio.
VTI:velocity time integral
E : E wave , A: A wave , T: total
33 : 33% /total ratio of integrals
MVE-DT:deceleration time of E wave
RFI:relative flow index

*P< o.o5 **P< 0.005 ***P< 0.001

Table (XVI) Comparison of right ventricular systoli and diastolic functional parameters by echo-Doppler. between PG-I and control.

Parameter	PG-I		Control		t test
	Mean	± SD	Mean	±SD	
RV-V-EF(%)	56.8	10.3	54.5	6.0	1.12
TAPS-EF (%)	30.9	9.7	36.4	5.0	2.70**
PA-PP-ET	0.24	0.04	0.24	0.03	0.30
PA- AC-ET	0.41	0.08	0.42	0.04	0.60
PA-SV(ml/b)	33.3	10.0	32.0	6.3	0.63
PMR	1.4	0.1	1.5	0.1	0.65
MAC(m/s^2)	9.2	3.6	7.8	1.7	1.90
ACR	0.42	0.09	0.43	0.06	0.51
IVC-CI (%)	31.2	11.8	42.8	7.3	4.81***
TV E/A	1.2	0.2	1.2	0.2	0.56
VTIE/A	1.7	0.7	1.6	0.6	0.49
VTI 33%	0.34	0.05	0.34	0.03	0.23

Abb:

RVV-EF : right ventricular ejection fraction.
TA-PS-EF:tricuspid annular plane systolic -ejection fraction.
PA-PP-ET: preejection period/ejection time.
PA-AC-ET:acceleration time / ejection time.
PA SV:stroke volume , PMR : peak / mean ratio
MAC:mean acceleration
ACR: acceleration ratio of integrals
IVC-CI:inferior vena cava collapsibility index
TV-E/A:E /A ratio, VTI - EA:E/A ratio of integrals
VTI 33: 33% / total ratio of integrals

*P< 0.05 **P< 0.005 ***P< 0.0001

Table (XVII) shows comparison of cardiac internal dimensions by M-mode echo between patients on initial examination (PG-I) and on recovery examination (PG-R). While IVS-D, PW-D and PW-S were not significantly different in PG-I (mean =12.8mm)compared with PG-R (mean = 12.2mm)($P< 0.05$). Left ventricular dimensions and volumes were significantly increased in PG-I compared with PG-R (mean = 66.5ml) ($P< 0.001$),however,LV-D-D, LVS-D and LVS-V were less significantly increased in PG-I (means =51mm, 32.9mm and 25.7ml respactively) compared with PG-R (means=49.1 mm, 31.4 mm and 22.8 ml respectively) ($P < 0.05$). LVM was also significantly increased in PG-I (mean= 89.7 gm) compared with PG-R (mean=78.8gm)($P<0.05$).AO,LA and LA/AO were all significantly increased in PG-I (means=27.6mm, 38.1 mm and 1.39 respectively) compared with PG-R (means = 26.6mm, 33.8mm and 1.28 respectively) ($P< 0.005$ and $P< 0.001$) RV-D was not significantly different between the two groups.

Table (XVIII) shows comparison of cardiac internal dimensions by 2D-echo between PG-I and PG-R . Of the four cardiac valves only TV-D and MV-D that were significantly increased in PG-I(means=30.2mm and 28.2mm respectively) compared with PG-R (means=27.6mm and 27.0 respectively) ($P<0.001$ and $P<0.005$), while PV-D and AO-D were not significantly different between the two groups. Right atrial dimensions (RA-LA, RA-SA and RA-AR) were all

significantly increased in PG-I (means= 45mm, 40.3mm and 11.7cm^2 respectively) compared with PG-R (means= 43.7mm and 10.2cm^2 respectively) (P< 0.005, P< 0.005 and P< 0.001). Left atrial dimensions were significantly increased ; except LA-SA, in PG-I compared with PG-R where LA-LA and LA-AR in PG-I (means= 45.8mm and 11.7cm^2 respectively) versus PG-R (means= 43.7mm and 10.2 cm^2 respectively) (P < 0.05 and P <0.001), whereas, LA/RA ratio was not significantly different between the two groups. Left atrial volumes (LA-V-S and LA-V-D) were significantly increased in PG-I (means=39 ml and 22 ml respectively) compared with PG-R (means 33 ml and 18 ml respectively) (P< 0.001). Right ventricular volumes(RV-V-D and RV-V-S) were significantly increased in PG-I (means= 14.8ml and 6.3ml respectively) compared with PG-R (means=11.5ml and 4.8ml respectively) (P< 0.001). Both IVC-MAX and IVC-MIN were significantly increased in PG-I (means=11.7mm and 8.3mm respectively) compared with PG-R (means =10.0mm and 6.5mm respectively) (P< 0.005 and P< 0.001).

Tables (XIX - XXI) show comparison of left and right ventricular systolic and diastolic functional parameters by echo-Doppler. between PG-I and PG-R. All parameters were not significantly different between the two groups (P > 0.05) except IVC-CI while was significantly decreased in PG-I (mean= 29.5%) compared with PG-R (mean=34.7%) (P< 0.005).

Table (XVII). Comparison of cardiac internal dimension by M-mode echocardiography between PG-I and PG-R.

Parameter	PG-I		PG-R		Paired
	Mean	± SD	Mean	±SD	t test
IVS-D(mm)	10.5	2.7	10.0	2.2	1.67
IVS-S(mm)	12.8	2.8	12.0	2.5	2.42*
PW-D(mm)	8.8	2.4	8.7	2.2	0.58
PW-S(mm)	11.7	2.4	11.6	4.2	0.32
LV-D-D(mm)	51.0	7.4	49.1	7.3	2.45*
LV-D-V(mm)	74.3	14.4	66.5	11.3	3.66***
LV-S-D(mm)	32.9	5.0	31.4	4.6	2.64*
LV-S-V(mm)	25.7	7.4	22.8	6.5	2.70*
LVM(gm)	89.7	25.5	78.8	22.5	3.15**
AO (mm)	27.6	4.5	26.6	3.7	2.83**
LA (mm)	38.1	6.2	33.8	5.5	6.54***
LA/AO	1.39	0.1	1.28	0.1	4.12***
RV-D(mm)	13.4	3.0	14.1	3.8	1.28

*P < 0.05 **P < 0.005 ***P < 0.001

Table (XVIII) Comparison of cardiac internal dimensions by 2D echocardiography between PG-I and PG-R

Parameter	PG-I		PG-R		Paired t test
	Mean	± SD	Mean	±SD	
AO-D (mm)	21.2	3.0	21.2	3.0	0.05
PV-D (mm)	21.5	3.3	21.5	3.7	0.23
TV-D (mm)	30.2	5.4	27.6	4.9	4.63***
MV-D (mm)	28.8	4.7	27.9	4.6	2.81**
RA-LA(mm)	45.0	8.1	42.8	6.9	2.79**
RA-SA(mm)	38.7	7.3	36.8	5.8	2.51**
RA-AR(cm^2)	10.4	2.0	9.3	1.4	3.43***
LA-LA(mm)	45.8	7.9	43.7	7.2	2.51*
LA-SA(mm)	40.3	9.4	37.7	6.5	1.78
LA-AE(cm^2)	11.7	2.7	10.2	1.8	3.61***
LA/RA(area)	1.14	0.25	1.1	0.17	0.76
LA-V-S(ml)	3.9	0.8	3.3	0.7	3.48***
LA-V-D(ml)	2.2	0.6	1.8	0.3	4.24***
RV-V-D(ml)	14.8	5.3	11.5	3.6	4.54***
RV-V-S(ml)	6.3	2.6	4.8	1.9	3.94***
IVC-MAX(mm)	11.7	2.3	10.0	2.3	3.24**
IVC-MIN(mm)	8.3	2.5	6.5	2.0	3.99***

*P< 0.05 ** P< 0.005 ***P< 0.001

Table (XIX). Comparison of left ventricular systolic functional parameters by echo-Doppler. between PG-I and PG-R.

Parameter	PG-I		PG-R		Paired
	Mean	± SD	Mean	±SD	t test
EF(%)	65.3	6.4	66.3	6.0	0.93
FS(%)	35.0	4.9	35.4	4.3	0.46
SVI(ml/b/M)	48.3	11.3	44.7	7.2	1.89
COP(L/m/M)	4.6	1.3	4.5	0.7	0.56
MSER(ml/s)	129.3	36.2	123.8	25.2	1.06
MVCFS(c/s)	1.08	0.2	1.08	0.19	0.14
AO-PP-ET	0.29	0.05	0.30	0.05	0.76
AO-AC-ET	0.32	0.06	0.33	0.06	0.93
AO-NPKV(m/s)	0.33	0.07	0.32	0.08	0.93
AO-SV(ml/b)	33.8	14.0	30.3	8.8	1.92
AO-PMR	1.5	0.1	1.5	0.1	0.18
AO-MAC(m/s^2)	13.9	4.0	12.4	3.4	1.67
AO-ACR	0.34	0.06	0.34	0.07	0.25

*P <0.05 ** P< 0.005 P< 0.001

Table (XX). Comparison of left ventricular diastolic functional parameters by echo-Doppler. between PG-I and PG-R.

Parameter	PG-I		PG-R		paired
	Mean	± SD	Mean	±SD	t test
IVRT(sec)	0.08	0.01	0.07	0.01	1.38
LA-DIM (%)	46.4	15.4	47.9	16.2	0.57
LA-C - DIM(%)	48.9	13.4	48.7	13.8	0.07
LA-EF(%)	41.6	10.4	43.6	9.8	0.86
MV E/A	1.7	0.3	1.6	0.3	0.98
VTI- E/A	2.6	1.0	2.3	0.5	1.51
VTI- E/T	0.7	0.1	0.6	0.08	1.50
VTI- A/T	0.29	0.06	0.30	0.06	0.59
VTI 33%	0.41	0.05	0.41	0.07	0.21
MV-E-DT(s)	0.10	0.03	0.11	0.02	0.15
MV-RFI	1.6	0.1	1.6	0.1	0.38

* P< 0.05 ** P< 0.005 *** P< 0.001

Table (XXI). comparison of right ventricular systolic and diastolic functional parameters by echo-Doppler. between PG-I and PG-R.

Parameter	PG-I		PG-R		paired
	Mean	± SD	Mean	±SD	t test
RV-V-EF(%)	56.8	11.5	57.4	8.5	0.26
TAPS-EF (%)	30.6	10.1	33.1	9.5	0.76
PA-PP-ET	0.25	0.04	0.25	0.04	0.15
PA- AC-ET	0.42	0.05	0.41	0.05	0.28
PA-SV(ml/b)	32.7	8.9	31.4	8.1	0.80
PMR	1.4	0.08	1.5	0.1	0.98
MAC(m/s^2)	8.5	2.5	8.5	2.2	0.05
ACR	0.42	0.07	0.41	0.05	0.28
IVC-CI (%)	29.5	11.7	34.7	11.5	2.62*
TV E/A	1.2	0.2	1.1	0.2	0.72
VTIE/A	1.7	0.7	1.5	0.4	2.0
VTI 33%	0.34	0.04	0.33	0.05	1.23

*P < 0.05 **P < 0.005 ***P < 0.001

Table (XXII) and figs (27 - 30) show comparison of left atrial dimensions, volumes and function by echo-Doppler between PG-R and controls. Both LA and LA/AO were still significantly increased in PG-R (means= 33.8mm and 1.28 respectively) compared with controls (means=30.5mm and 1.14 respectively) ($p< 0.005$ and $P< 0.001$). In addition, LA-AR and LA/RA were also significantly increased in PG-R (means = 10.2cm^2 and 1.10 respectively) compared with controls (means=9.1cm^2 and 1.01respectively)($P<0.05$). While LA-V-S was significantly increased in PG-R (mean=33.1 ml) compared with controls (means=28.6 ml) ($P< 0.05$), yet LA-V-D was not significantly different between the two groups. Lastly, LA-DIM and LA-EF were significantly increased in PG-R (means = 47.9% and 43.6% respectively) compared with controls (means= 40.3% and 37.4% respectively) ($P< 0.05$).

Table (XXIII) and figs(31, 32) show comparison of cardiac internal dimensions by 2D echo. between G1,G2 and G3. AO-D was significantly increased in G3 (mean = 24.2mm) compared with G1 (mean 21.1mm)and G2 (mean =20.7mm) ($P< 0.05$).TV-D was significantly increased in G3 (mean=34.9mm) compred with both G1 (mean=29.2mm) and G2(mean=29.3mm)($P< 0.05$). MV-D was also significantly increased in G3 (mean=22.6mm) compared with G1(mean= 19.6)($P<0.05$), while no significant difference was obtained between G1 and G2 ($P > 0.05$).

Table (XXII). Comparison of left atrial dimensions, volumes and function by echo-Doppler. between PG-R and control group.

Parameter	PG-I		Control		t test
	Mean	± SD	Mean	±SD	
LA(mm)	33.8	5.5	30.5	4.8	2.59**
LA/AO	1.28	0.14	1.14	0.10	4.52***
LA-AR(cm^2)	10.2	1.8	9.1	1.5	2.50*
LA/RA	1.10	0.17	1.01	0.14	2.25*
LA-V-S(ml)	33.1	7.6	28.6	9.1	2.20*
LA-V-D(ml)	18.3	3.7	17.7	6.0	0.50
LA- DIM(%)	47.9	16.2	40.3	12.9	2.05*
LA-EF(%)	43.6	9.8	37.4	13.5	2.13*
IVC-CI	34.7	11.5	42.8	7.3	3.34***

*P< 0.05 ** P < 0.005 P < 0.001

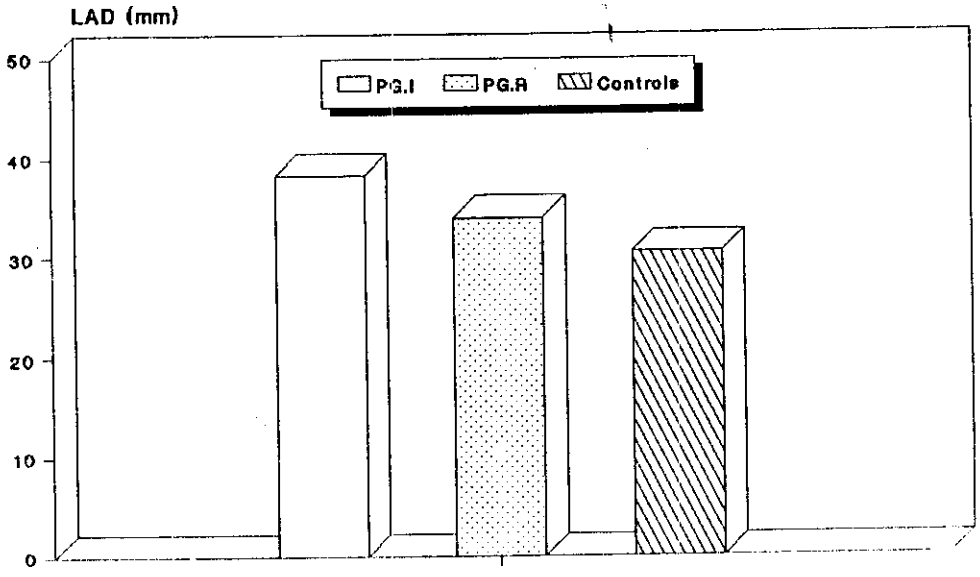


Figure (27): ***Left atrial dimension among patients of PG.I, PG.R and control group***

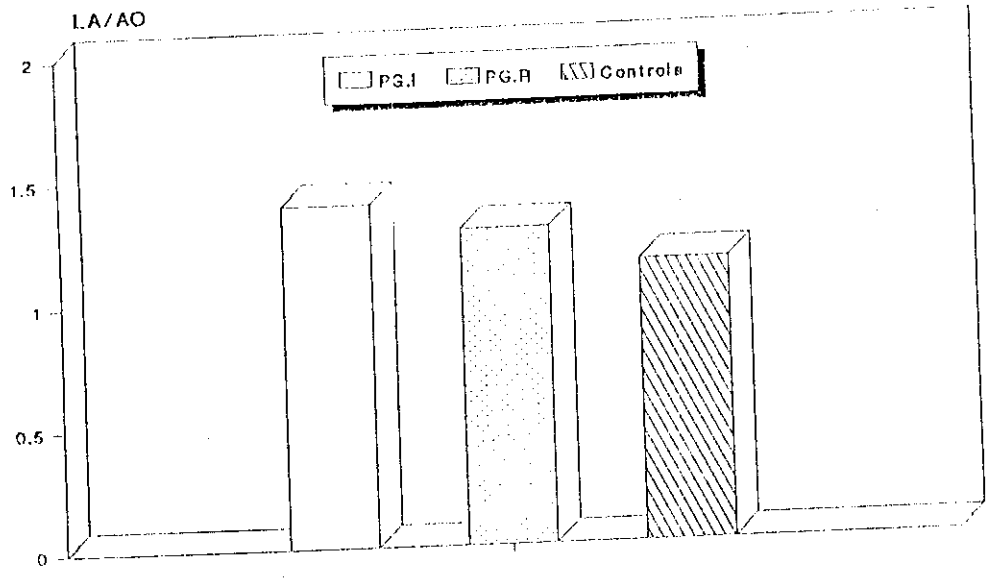


Figure (28). *Left atrium/aorta ratio among patients of PG.I, PG.R and control group*

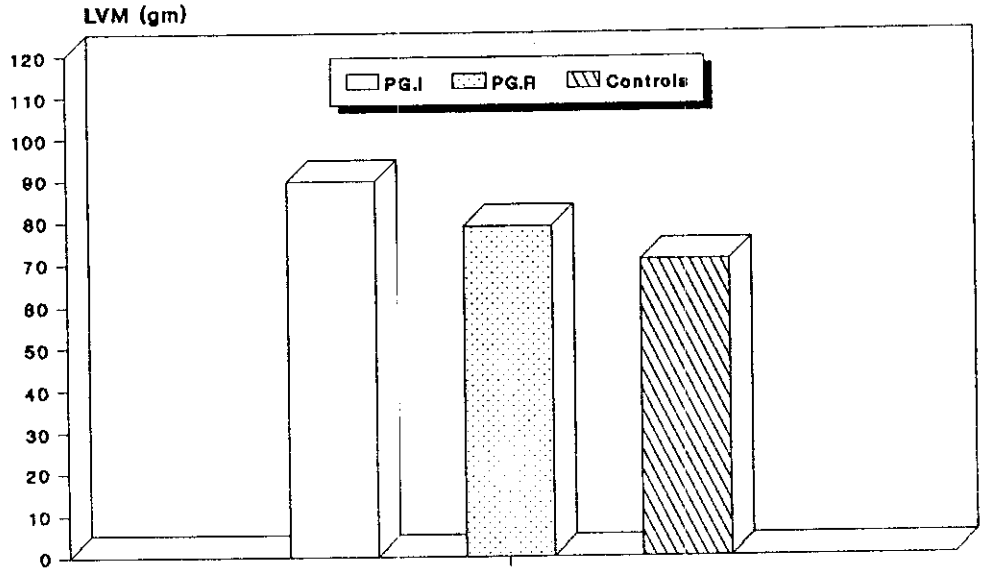


Figure (29). *Left ventricular mass in among PG.I, PG.R and Control groups.*

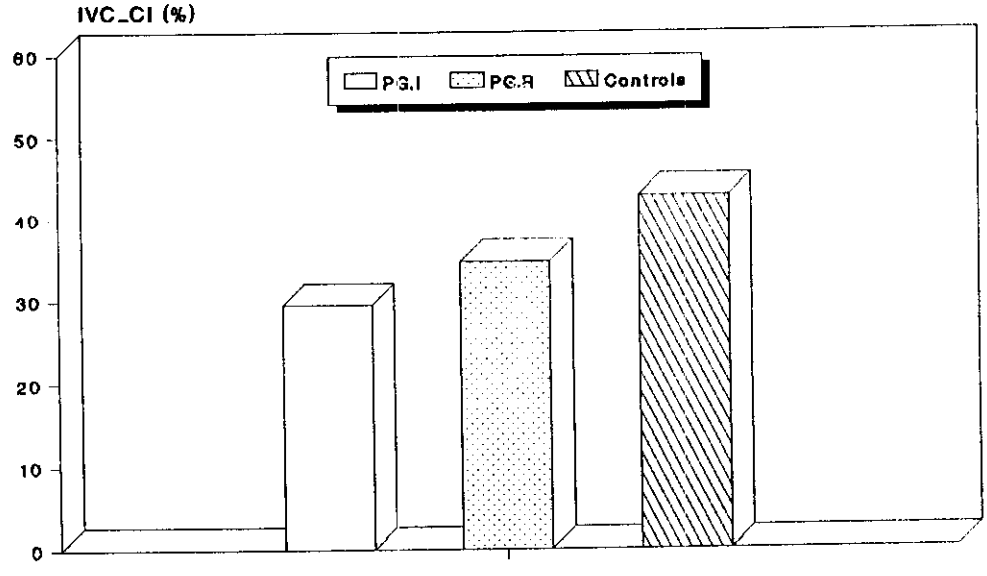


Figure (30). *IVC collapsability index among PG.I, PG.R and control group.*

Table (XXIV) and figs (33 - 36) show comparison of LV systolic function between G1,G2 and G3. EF was significantly decreased in G3 (mean =59.3%) compared with G2(mean = 67.1%) and it was significantly increased in G2 compared with G1(mean = 63.9%) ($P< 0.05$). FS was significantly decreased in G3(mean=30.3%) compared with G2 (mean = 36.5%) ($P< 0.05$). COP was significantly decreased in G3 (mean = 3.7 $L/m/M^2$) compared with G2 (mean= 5.2 $L/m/M^2$) ($P< 0.005$). MSER was significantly decreased in G3 (mean= 123 ml /s) compared with G2 (mean= 145.6 ml/s) ($P< 0.005$). MVCFS was significantly increased in G3 (1.19 cir/m) compared with G1(mean = 0.98 cir/m) ($P< 0.05$). While no significantly difference was aobtained between G3 and G2 (mean = 1.11 cir/m)($P > 0.05$). AO-PP-ET was significantly increased in G3 (mean = 0.34) compared with both G1 (mean= 0.28) and G2 (mean = 0.29)($P< 0.005$). AO-AC-ET was significantly increased in G3 (mean= 0.37) compared with G1 (mean =0.29) and G2(mean = 0.33) ($P< 0.005$).AO-ACR wsa significantly increased in G3 (mean = 0.37) compared with G1(mean = 0.31) ($P< 0.05$), while no significant difference was obtained between G3 and G2 (mean = 0.36) ($P > 0.05$)

Table (XXIII). Comparison of cardiac internal dimensions by 2D-echo. between G1,G2 and G3.

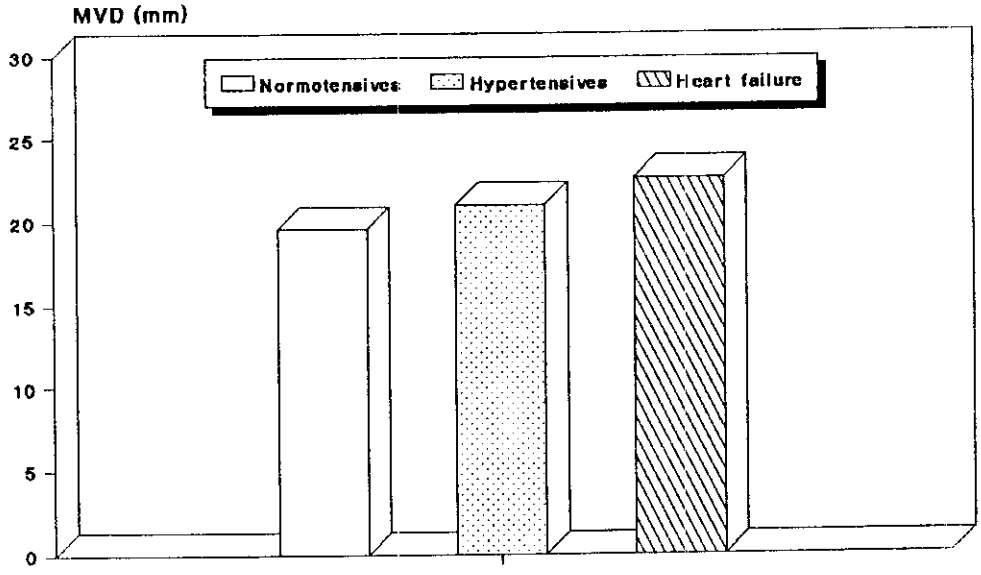
Parameter	G1		G2		G3		Ftest, LSD
	Mean	±SD	Mean	±SD	Mean	±SD	
Ao-D(mm)	20.7	2.9	21.1	2.6	24.2	1.7	4.1* 3,2-3,1
TV-D(mm)	29.2	4.2	29.3	4.2	34.9	5.7	4.1* 3,2-3,1
MV-D(mm)	19.6	2.2	21.0	2.0	22.6	3.5	4.4* 3,1
LAVS(ml/M^2)	3.6	0.6	3.8	0.7	4.5	1.4	3.6* 3,2-3,1

*P < 0.05

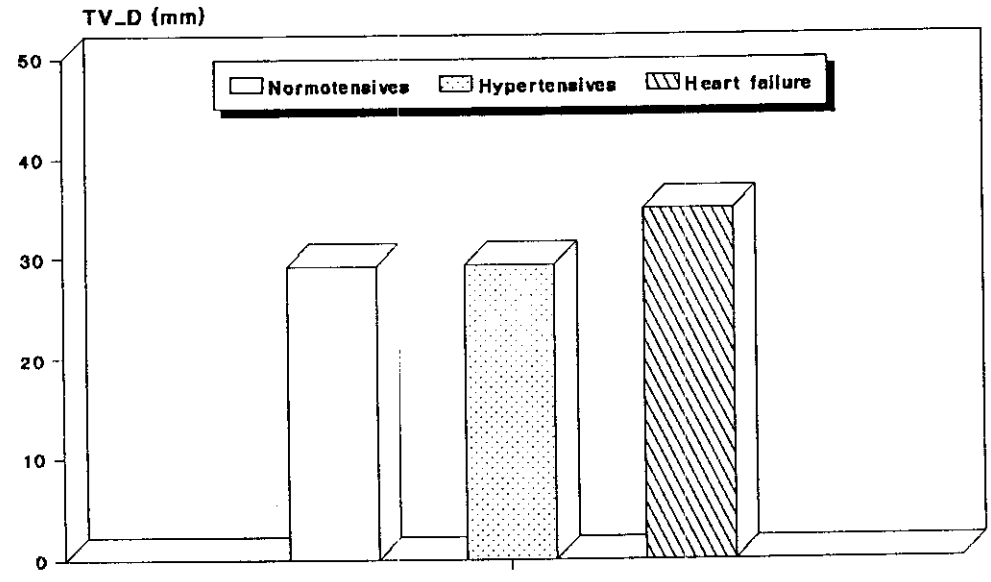
Table (XXIV). Comparison of L.V. systolic function by echo-Doppler. between G1,G2 and G3.

Parameter	G1		G2		G3		F test, LSD
	Mean	±SD	Mean	±SD	Mean	±SD	
EF(%)	63.9	5.0	67.1	5.6	59.3	6	3.4* 2,1-2,3
FS(%)	33.9	3.8	36.5	4.4	30.3	3.7	3.5* 2,3
COP(L/m)	4.2	0.7	5.2	1.5	3.7	0.9	5.8** 2,1-2,3
MS-ER(ml/sec)	108.8	28.5	145.6	36.7	123	26.9	7.0** 3,1-2,1
MV-CFS(cir/m)	0.98	0.16	1.11	0.16	1.19	0.31	4.2* 3,1
AO-PP-ET	0.28	0.04	0.29	0.04	0.34	0.06	5.8** 3,1-3,2
AO-AC-AT	0.29	0.07	0.33	0.05	0.37	0.05	5.8** 3,1-2,1
AO-ACR	0.31	0.06	0.36	0.07	0.37	0.05	3.8* 3,1-2,1

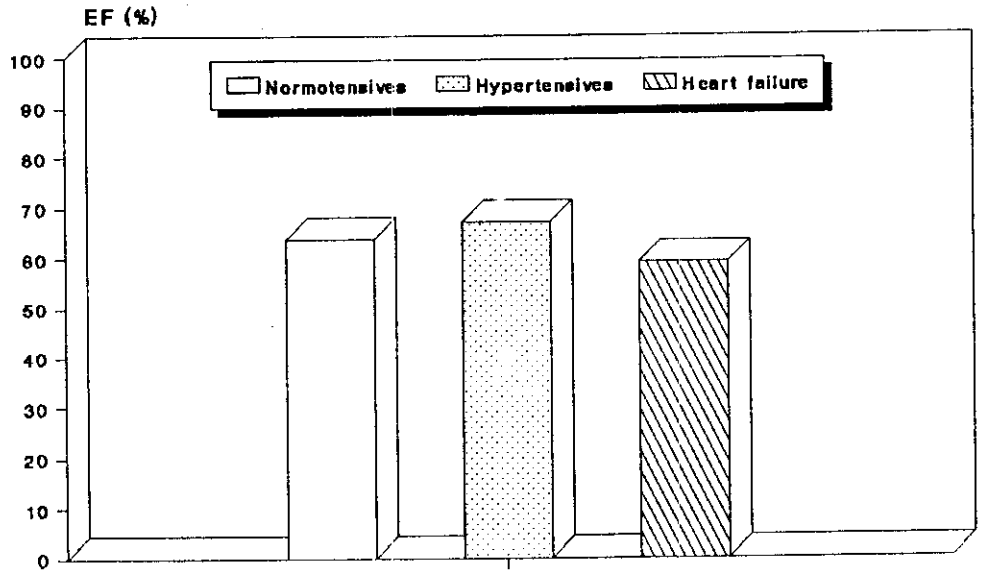
*P < 0.05 **P< 0.005



Figure(31). *MV_D among the three studied patient groups.*



Figure(32). *TV_D among the three studied patient groups.*



Figure(33). *Ejection fraction among the three studied patient groups.*

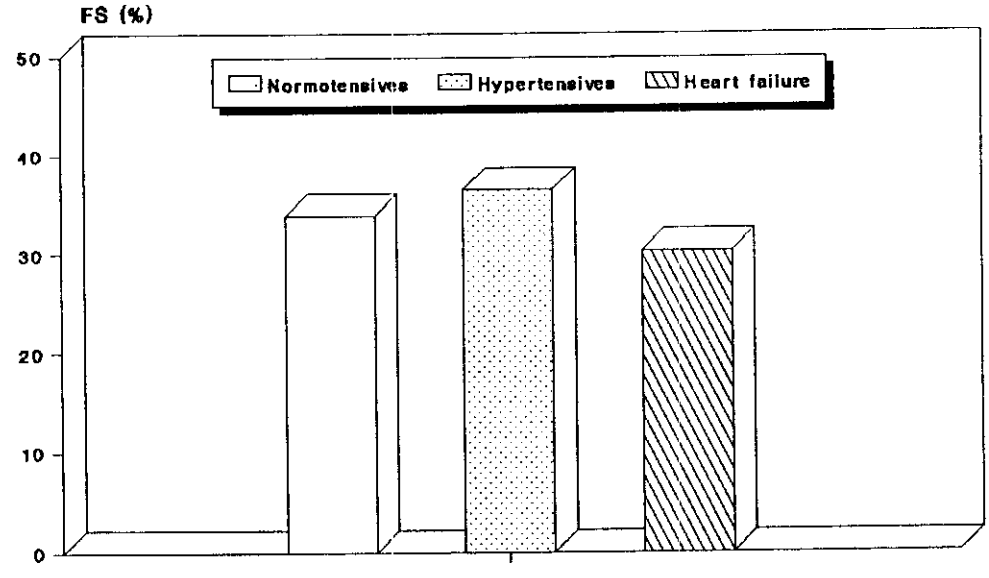


Figure (34).. *Fractional shortening among three studied patient groups.*

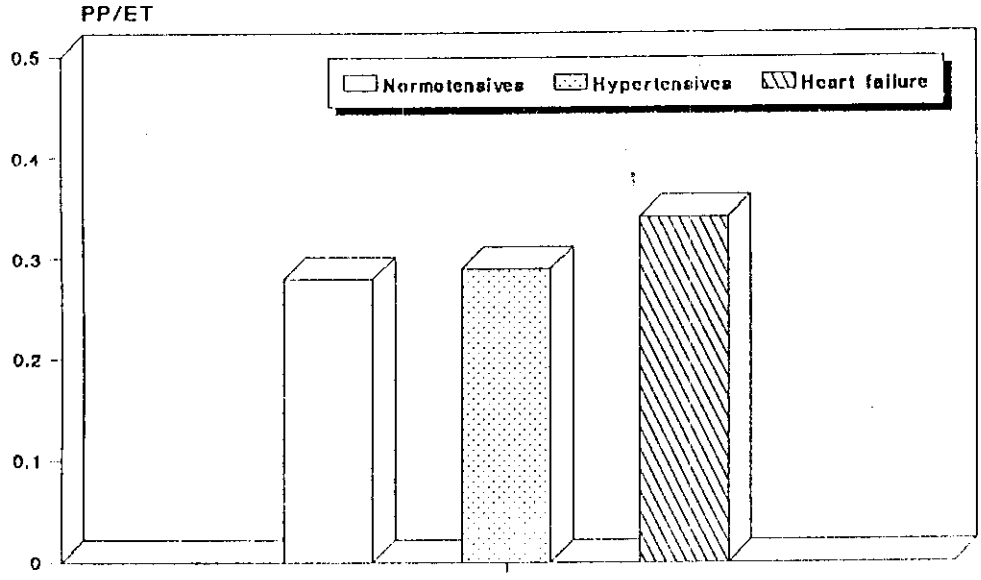


Figure (35). *Ao_PPET among the three studied patient groups.*

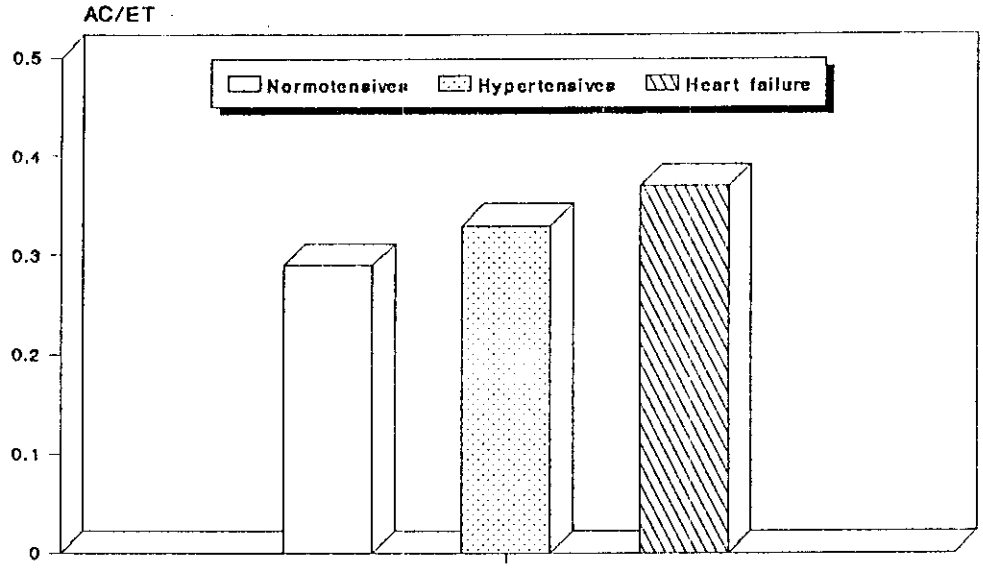


Figure (36). *Ao_ACET among the three studied patient groups.*

The grades of artrioventricular (AV) valve regurgitation and their time of disappearance in the three patient groups are shown in tables (XXV-XXVII). The percent distribution of different grades of mitral regurgitation (MR) among the three patient groups is shown in table (XXVIII). Grade I MR was found in 33.3% of G1, 39.1% of G2 and 33.3% of G3. Grades II and III-IV MR were only found in G3, where grade II was found in 16.7% while grade III-IV in 33.5% of cases.

The precent distribution of different grades of tricuspid regurgitation (TR) among the three patient groups was shown in table (XXIX). Grade I TR was found in 47.6% of G1, 60.9% of G2 and no case of G3.Grade II TR was found in 4.8% of G1, 13% ofG2 and 66.7% of G3. Grade III-IV TR was found only in G3 and represents 33.3% of their cases.

Table (XXV). A.V. valvular regurgitations and its time of disappearance by D-echo in group one.

Ser No	MR		TR		Case No
	Grade	Time disapp. (wks)	Grade	Time disapp. (wks)	
1	-	-	I	6	1
2	-	-	-	-	2
3	I	2	I	6	6
4	-	-	-	-	7
5	-	-	I	10	8
6	-	-	I	6	11
7	I	2	I	6	13
8	-	-	I	6	14
9	I	2	I	6	17
10	-	-	I	6	18
11	-	-	-	-	23
12	I	2	II	14	24
13	-	-	-	-	33
14	I	2	-	-	34
15	-	-	-	-	35
16	-	-	-	-	36
17	-	-	-	-	40
18	-	-	-	-	42
19	-	-	I	...	46
20	-	-	-	-	48
21	I	...	I	...	50

Abb.

MR : Mitral regurgitation

TR : tricuspid regurgitation

\- : No valvular regurgitation

... : Not avaiable

Table (XXVI). A.V. valvular regurgitation and its time of disappearance by D-echo in group two.

Ser No	MR		TR		Case No
	Grade	Time disapp. (wks)	Grade	Time disapp. (wks)	
1	-	-	I	6	3
2	I	2	I	10	4
3	I	2	I	2	5
4	-	-	II	14	9
5	I	2	I	6	10
6	I	2	I	2	12
7	I	2	I	6	15
8	-	-	II	6	16
9	-	-	-	-	19
10	I	2	-	-	20
11	-	-	-	-	22
12	-	-	I	14	25
13	-	-	I	14	27
14	-	-	II	14	29
15	-	-	I	6	32
16	-	-	-	-	37
17	I	...	I	...	38
18	I	...	I	...	39
19	I	...	I	...	41
20	-	-	-	-	43
21	-	-	I	...	45
22	-	-	-	-	47
23	I	...	I	...	49

Table (XXVII). A.V. valvular regurgitation and its time of disappearance by D- echo in group three

Ser No	MR		TR		Case No
	Grade	Time disapp. (wks)	Grade	Time disapp. (wks)	
1	I	2	II	10	21
2	II	6	II	6	26
3	I	6	III	10	28
4	IV	10	III	18	30 #
5	III	2	II	2	31
6	-	-	II	...	44

In case no. 30, there were also aortic and pulmonary regurgitation that disappeared on recovery D-echo examination (figs. 39,40).

Table (XXVIII). Percent distribution of MR grades among group one, group two, group three.

MR	O	I	II	III-IV	Total
G1	14 66.7%	7 33.3%	0	0	21 42.0%
G2	14 60.9%	9 39.1%	0	0	23 46.0%
G3	1 16.7%	2 33.3%	1 16.7%	2 33.5%	6 12.0%
Total	29 58.0%	18 36.0%	1 2.0%	2 4.0%	50 100.0%

O = absent MR

Table (XXIX). Percent distribution of TR grades among group one, group two, group three.

TR	O	I	II	III-IV	Total
G1	10 47.6%	10 47.6%	1 4.8%	0	21 42.0%
G2	6 26.1%	14 60.9%	3 13.0%	0	23 46.0%
G3	0	0	4 66.7%	2 33.3%	6 12.0%
Total	16 32.0%	24 48.0%	8 16.0%	2 4.0%	50 100.0%

O = absent TR

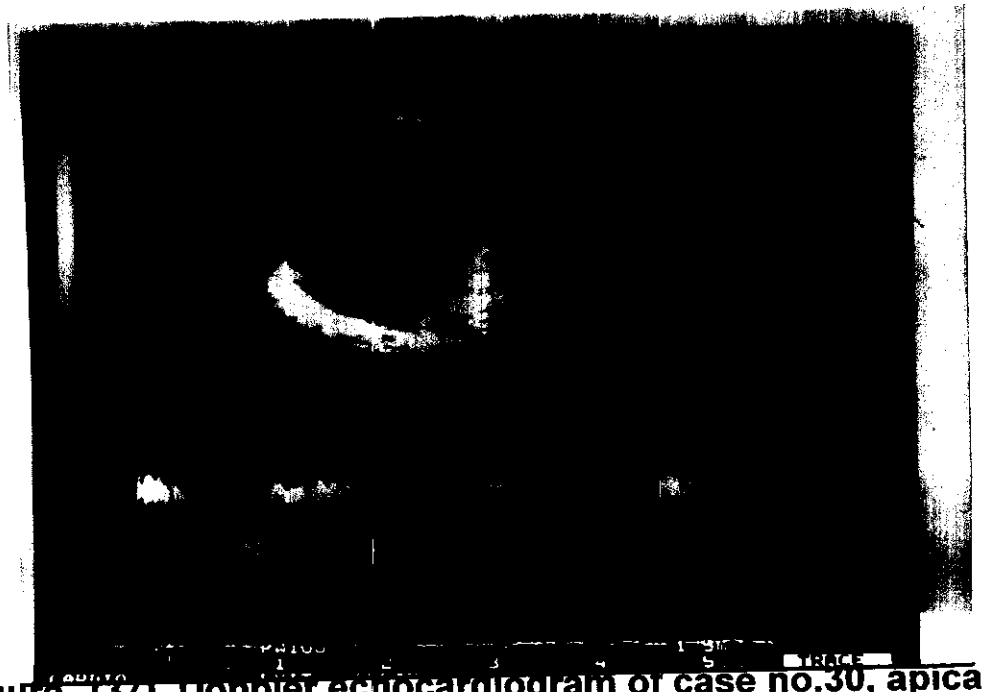


Figure (37). Doppler echocardiogram of case no.30, apical 4 chamber view with the sample volume in the left atrium showing grade III-IV MR.

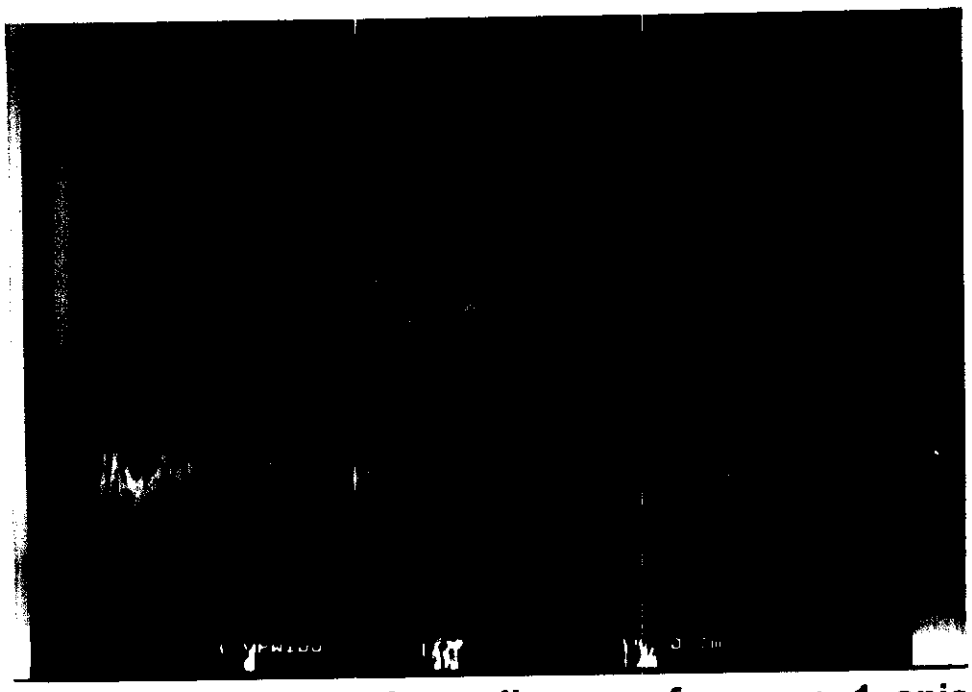


Figure (38). Doppler echocardiogram of case no. 1, apical 4 chamber view with the sample volume just proximal to tricuspid valve, showing grade I TR.

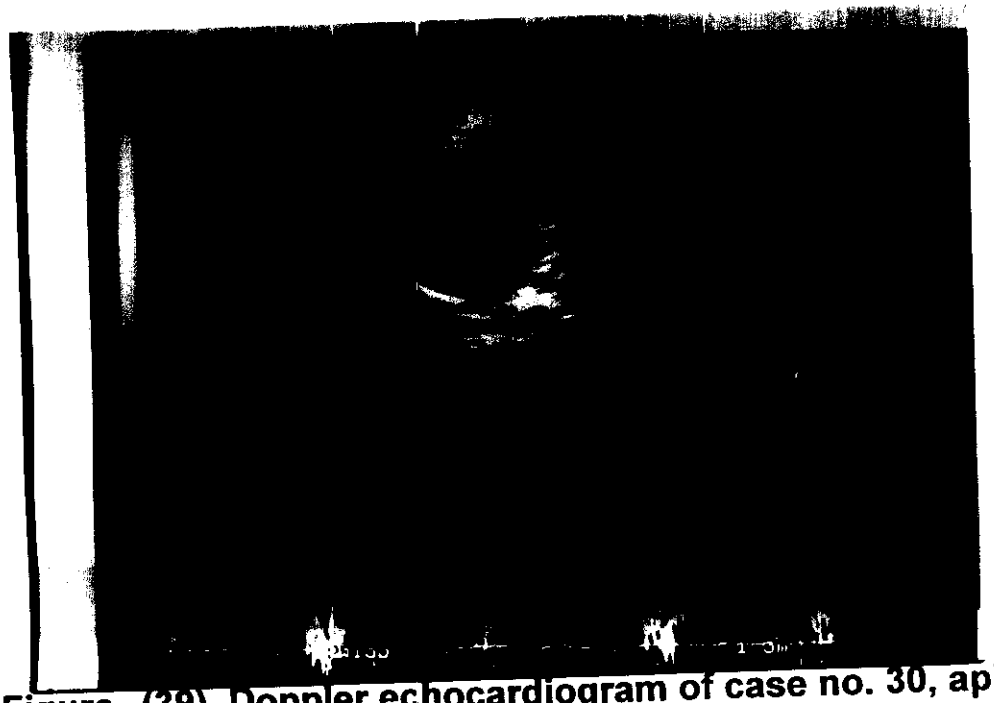


Figure (39). Doppler echocardiogram of case no. 30, apical 5 chamber view showing diastolic flow of aortic regurgitation.

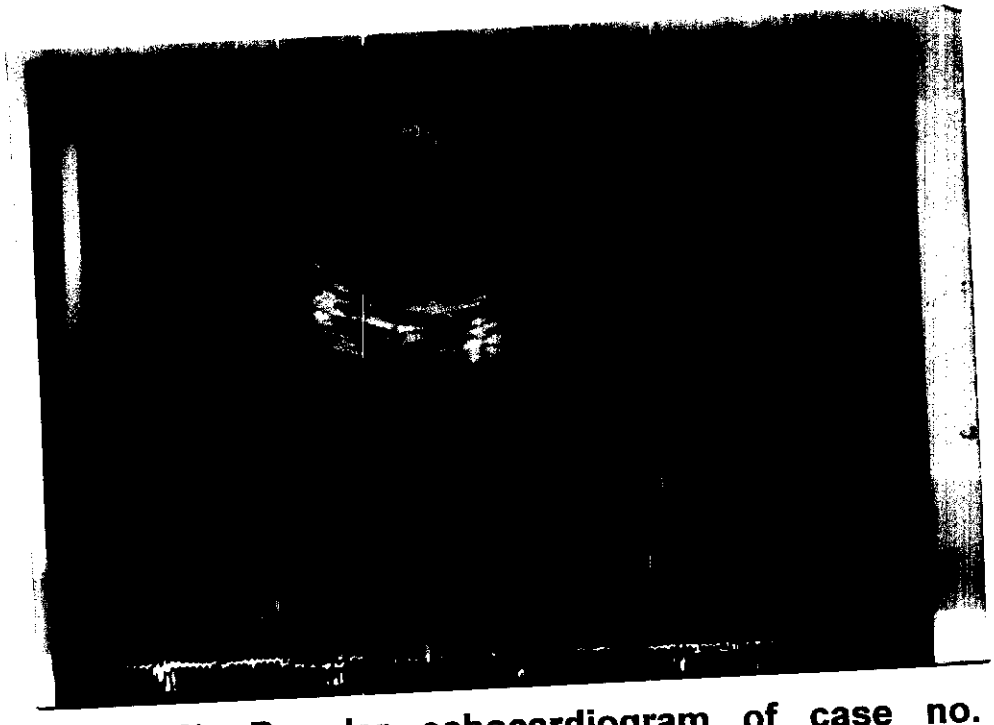


Figure (40). Doppler echocardiogram of case no. 30, parasternal short axis view showing diastolic flow of pulmonary regurgitation.

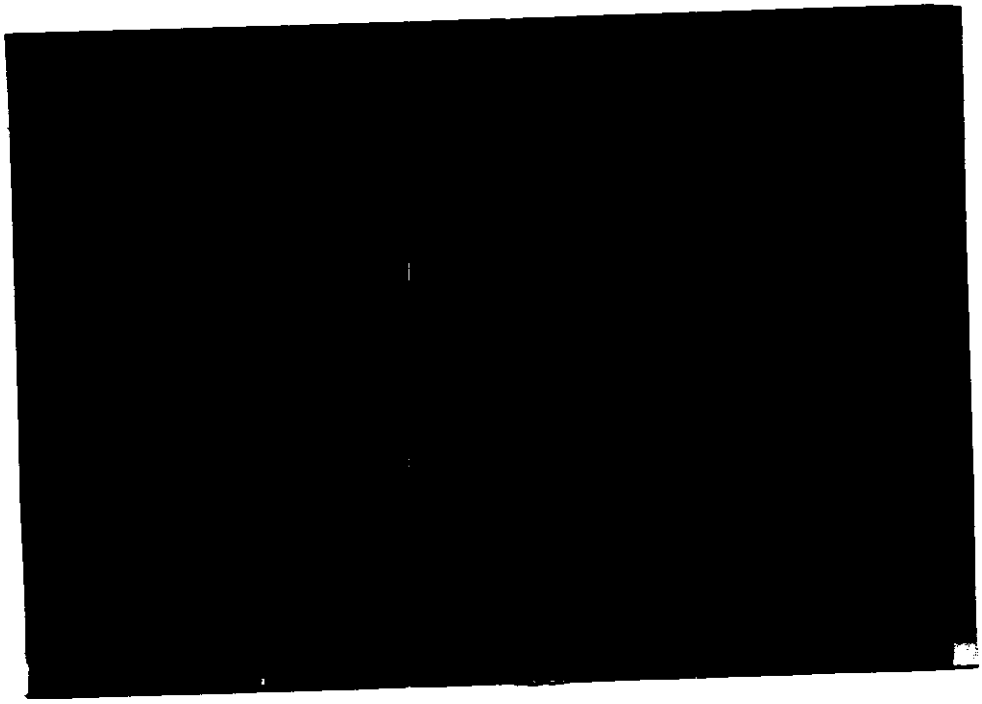


Figure (41). Doppler echocardiogram of case no. 10, apical 4 chamber view with the sample volume located proximal to mitral valve, showing holosystolic flow of MR.

Figure (42). Doppler echocardiogram of case no. 10, 2 weeks later showing that MR had disappeared.