RESULTS

This study included 30 patients with coronary artery disease who had previous stenting in one or more of their native coronary arteries and were referred to the Cardiac Catheterization Laboratory of Nasr City Health Insurance Hospital for purpose of treating their ISR.

At presentation, twenty-three patients (76.7%) had diffuse ISR while the remaining seven patients (23.3%) had focal ISR.

***Patient characteristics were as follows:**

- ***Age:*** *(table 9, figure5).*

The mean age of the patients was 53.8±7.7 (range from: 39 to 68 years).

- ***Sex:*** *(table 9).*

Among the studied patients, the male sex was predominant with twenty-seven males (90%) and only three females (10%). The male to female ratio was (9:1).

Twenty-one patients out of the twenty-three who had diffuse ISR were males (91.3%) while two were females (8.7%).

Six patients out of the seven with focal ISR were males (85.7%) with only one female (14.3%). (P=0.6).

- ***Hypertension:*** *(table 10).*

Among the studied patients, twenty patients (66.7%) had hypertension, while ten patients (33.3%) had no hypertension.

Sixteen patients out of the twenty-three whom had diffuse ISR had hypertension (69.6%) while the remaining seven patients were not (30.4%).

Four patients out of the seven with focal ISR were hypertensives (57.1%) with three normotensive patients (42.9%).

(P=0.54).

- ***Diabetes mellitus:*** *(table 10).*

Within the studied group, seventeen patients (65.7%) were diabetics and the remaining thirteen patients (43.3%) were not.

Twelve patients out of the twenty-three who had diffuse ISR were diabetics (52.2%), while the remaining eleven patients were not (47.8%).

Five patients out of the seven with focal ISR had DM (71.4%) with two non-diabetics (28.6%). (P=0.6).

- ***Smoking:*** *(table 10, figure 6).*

Within the studied patients, eighteen patients (60%) were smokers, while the remaining twelve patients (40%) were not.

Fifteen patients out of the twenty-three who had diffuse ISR were smokers (65.2%) while eight patients (34.8%) were not.

Three patients out of the seven with focal ISR were smokers (42.9%) with the remaining four patients (57.1%) non-smokers.

(P=0.30).

- ***Dyslipidemia:*** *(table 11).*

Within the studied group, only two patients (6.7%) had hypercholesterolemia in contrast to twenty-eight patients (93.3%) that did not have.

These two patients had diffuse ISR at presentation.

None of the patients who had focal ISR was hypercholesterolemic. (P=0.42).

- ***Obesity:*** *(table 11, figure 7).*

Among the studied group, four patients (13.3%) were obese, with twenty-sex non-obese patients (86.7%).

Two patients out of the twenty-three who had diffuse ISR were obese (8.7%) while the other twenty-one patients were not (91.3%).

Two patients out of the seven with focal ISR were obese (28.6%) with five non-obese patients (71.4%).

(P=0.17).

- ***Stent location:*** *(table 12, figure 8).*

Among the studied group, twenty-five patients (83.3%) had stents in the LAD, three patients (10%) had stents in the LCX and two patients (6.7%) had RCA stents.

Nineteen patients out of the twenty-three who had diffuse ISR had LAD stents (82.6%), three patients (13%) had LCX stents while one patient (4.4%) had an RCA stent.

Six patients out of the seven with focal ISR had Had LAD stents (85.7%), one patient had an RCA stent (14.3%) and no one had an LCX stent. (P=0.42).

- ***Stent size:*** *(table 12).*

In the studied group, fifteen patients (50%) had stents of the 3*18mm size, five patients (16.7%) had 3*15mm stents, four patients (13.3%) had 3*20mm stents, two patients (6.7%) had 3.5*15mm stents, another two patients (6.7%) had 3.5*13mm stents, one patient (3.3%) had a 3*12mm stent and the remaining one (3.3%) had 2.5*15mm stent.

There was no significant difference as regard the stent size and the occurrence of either focal or diffuse ISR.

(P=0.36).

- ***Percentage of ISR:*** *(table 13).*

Seven patients (23.3%) in the studied group had a 90% ISR, another seven patients (23.3%) had 95% occlusion, five patients (16.7%) had 80% occlusion, another five patients (16.7%) had 85% occlusion, three patients (10%) had 99% ISR and the remaining three patients (10%) had total occlusion.

There was no significant difference as regard the percentage and type of ISR. (P=0.11).

- ***Reference Vessel diameter (RVD):*** *(table 13).*

Of the studied group, twenty-five patients (83.4%) had their RVD as 3mm, three patients (10%) had a RVD of 3.5mm, one

patient had a RVD of 2.7mm and the last one (3.3%) had his RVD as 2.5mm.

Also, no significant difference was seen as regard the RVD and the type if ISR. (P=0.85).

- ***Balloon types used for PCI to ISR:*** *(table 14, figure 9).*

In the studied patients, twenty-four subjects (80%) underwent successful PCI to ISR using the conventional balloon and in the remaining six patients (20%) cutting balloon angioplasty was used.

In eighteen patients out of the twenty-three with diffuse ISR (78.3%) the conventional balloons were used and the cutting balloon was used in the remaining five patients (21.7%).

Cutting balloon angioplasty was used to treat one patient out of the seven with focal ISR (14.3%) and the conventional simple balloon was used in the other six patients (85.7%).

(P=0.66).

***Follow-up data of the studied patients:** *(table 15, figure 10).*

- *Three months follow-up:*

Only one patient (patient number 17, who represented 3.3% of the studied group) had recurrence of anginal symptoms during the initial three months follow-up period. He underwent repeat coronary angiography which demonstrated a 100% occlusion within the stented segment of the LAD and CABG was recommended for him (LIMA to LAD). The remaining twenty-

nine patients (96.7%) did not suffer any adverse cardiac event during the three months follow-up period.

(P=0.57).

- *Six months follow-up:*

Exercise treadmill ECG was done to the remaining patients at six months period. Only one patient (patient number 17, who represented 3.3% of the studied group) had a positive exercise test and so she underwent repeat coronary angiography that demonstrated the recurrence of a focal 95% ISR which required repeat PCI to recurrent ISR. The others had negative test results.

(P=0.06).

Table (9): Age and sex of studied patients distributed by ISR type.

Variable	ISR type				Total		P-value of difference
	Diffuse		Focal				
	No.	%	No.	%	No.	%	
Age groups:							P= 0.07 NS
<50 y.	6	26.1	3	42.9	9	30	
50-60 y.	14	60.9	1	14.3	15	50	
>60 y.	3	13	3	42.9	6	20	
Sex:							P= 0.6 NS
Male:	21	91.3	6	85.7	27	90	
Female:	2	8.7	1	14.3	3	10	
Total	23	100	7	100	30	100	

Table (10): Smoking status, diabetes mellitus and hypertension of studied patients distributed by ISR type.

Variable	ISR type				Total		P-value of difference
	Diffuse		Focal				
	No.	%	No.	%	No.	%	
Smoking:							P= 0.30 NS
Positive:	15	65.2	3	42.9	18	60	
Negative:	8	34.8	4	57.1	12	40	
DM:							P= 0.36 NS
Positive:	12	52.2	5	71.4	17	65.7	
Negative:	11	47.8	2	28.6	13	43.3	
Hypertension:							P=0.54 NS
Positive:	16	69.6	4	57.1	20	66.7	
Negative:	7	30.4	3	42.9	10	33.3	
Total	23	100	7	100	30	100%	

Table (11): Dyslipidemia and obesity status among studied patients distributed by ISR type.

Variable	ISR type				Total		P-value of difference
	Diffuse		Focal				
	No.	%	No.	%	No.	%	
Dyslipidemia:							P= 0.42 NS
Positive:	2	8.7	-	-	2	6.7	
Negative:	21	91.3	7	100	28	93.3	
Obesity:							P= 0.17 NS
Positive:	2	8.7	2	28.6	4	13.3	
Negative:	21	91.3	5	71.4	26	86.7	
Total	23	100	7	100	30	100%	

Table (12): Stent size and site in studied patients distributed by ISR type.

Variable	ISR type				Total		P-value of difference
	Diffuse		Focal				
	No.	%	No.	%	No.	%	
Stent size:							
3-18:	12	52.2	3	42.9	15	50	P= 0.36 NS
3.5-18:	1	4.3	1	14.3	2	6.7	
3-20:	4	17.4	-	-	4	13.3	
3-15:	4	17.4	1	14.3	5	16.7	
2.5-15:	-	-	1	14.3	1	3.3	
3.5-13:	1	4.3	1	14.3	2	6.7	
3-12:	1	4.3	-	-	1	3.3	
Stent site:							
LAD:	19	82.6	6	85.7	25	83.3	P= 0.42 NS
LCX:	3	13	-	-	3	10	
RCA:	1	4.4	1	14.3	2	6.7	
Total	23	100	7	100	30	100%	

Table (13): Percent ISR and RVD (in mm) in studied patients distributed by ISR type.

Variable	ISR type				Total		P-value of difference
	Diffuse		Focal				
	No.	%	No.	%	No.	%	
%ISR:							
80%:	2	8.7	3	42.9	5	16.7	
85%:	5	21.7	-	-	5	16.7	P= 0.11
90%:	4	17.4	3	42.9	7	23.3	NS
95%:	6	26.2	1	14.2	7	23.3	
99%:	3	13	-	-	3	10	
100%:	3	13	-	-	3	10	
RVD(mm):							
2.5:	1	4.3	-	-	1	3.3	P= 0.85
2.7:	1	4.3	-	-	1	3.3	NS
3:	19	82.6	6	85.7	25	83.4	
3.5:	2	8.8	1	14.3	3	10	
Total	23	100	7	100	30	100%	

Table (14): Balloon type used for PCI in studied patients distributed by ISR type.

Variable	ISR type				Total		P-value of difference
	Diffuse		Focal				
	No.	%	No.	%	No.	%	
Balloon type:							P= 0.66
Simple:	18	78.3	6	85.7	24	80	NS
Cutting:	5	21.7	1	14.3	6	20	
Total	23	100	7	100	30	100%	

Table (15): Follow-up data of studied patients distributed by ISR type.

Variable	ISR type				Total		P-value of difference
	Diffuse		Focal				
	No.	%	No.	%	No.	%	
3-months clinical follow-up:							P= 0.57 NS
Chest pain:	1	4.3	-	-	1	3.3	
No events:	22	95.7	7	100	29	96.7	
3-months angiographic follow-up:							P= 0.57 NS
Done:	1	4.3	-	-	1	3.3	
Not done:	22	95.7	7	100	29	96.7	
6-months stress ECG follow-up:							P= 0.06 NS
Positive:	-	-	1	14.3	1	3.3	
Negative:	23	100	6	85.7	29	96.7	
6-months angiographic follow-up:							P= 0.06 NS
Done:	-	-	1	14.3	1	3.3	
Not done:	23	100	6	85.7	29	96.7	
Total	23	100	7	100	30	100%	

Fig. 5 : Age of studied sample distributed by ISR type

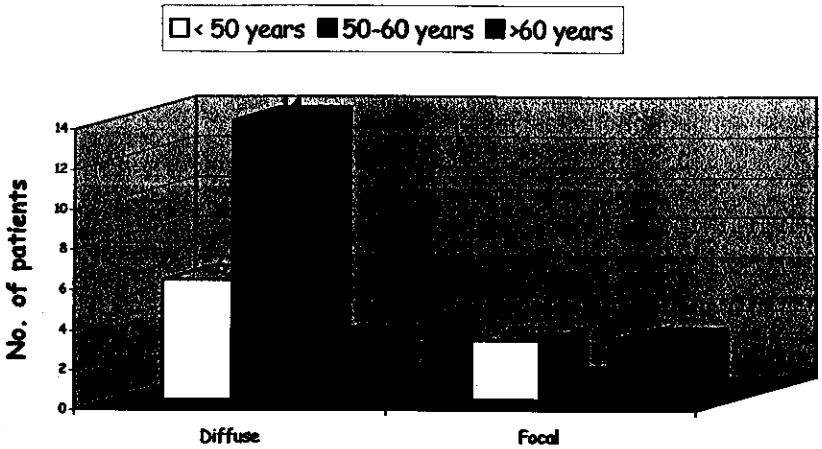

Fig.6: Smoking status distributed by ISR type

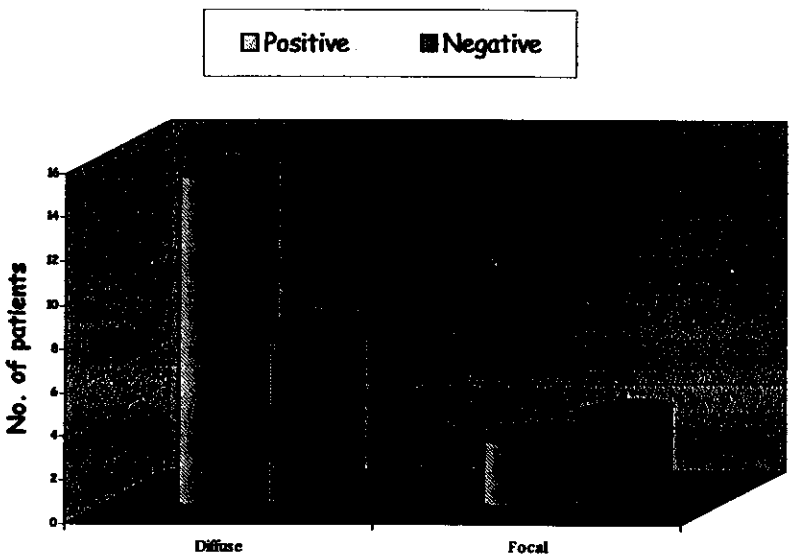

Fig7: Obesity distributed by ISR type

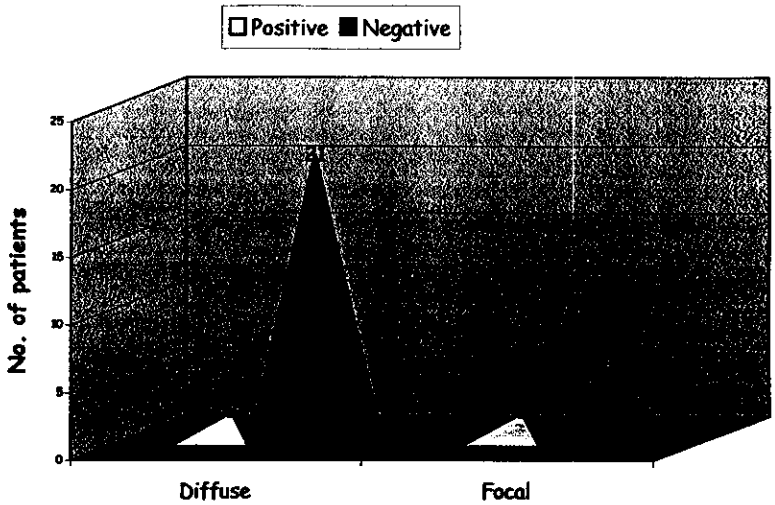

Fig8: Stent site distributed by ISR type

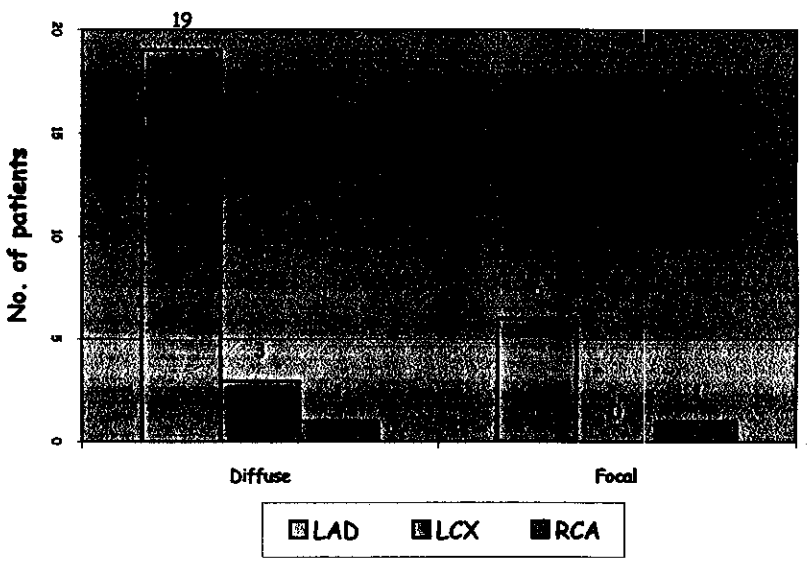

Fig 9: Balloon type used for PCI distributed by ISR type

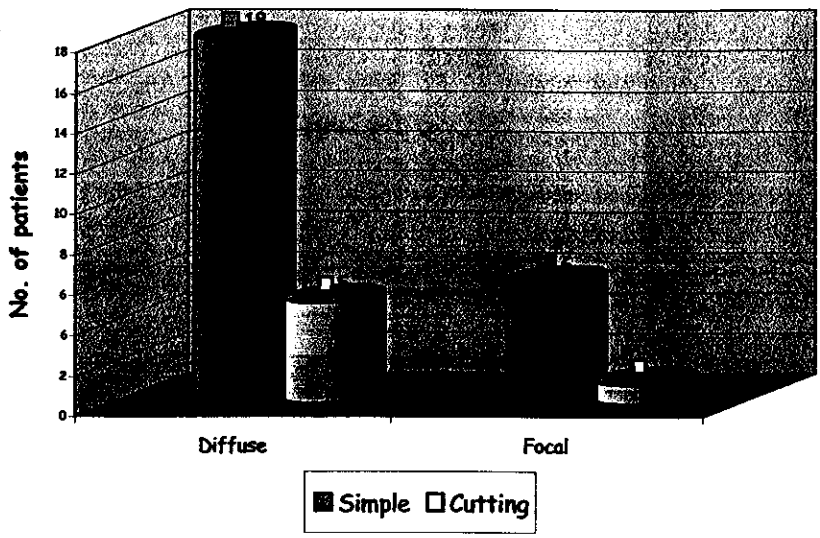

Fig 10: Three months clinical follow up data of studied patients

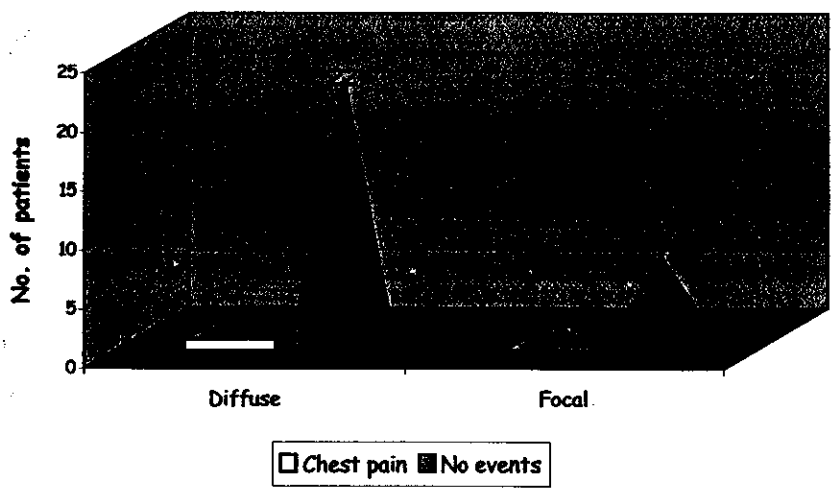

Fig.11 : Three months angiographic follow up