Investigation of coronary artery incidents after revascularization

Investigación de incidentes de la arteria coronaria después de la revascularización

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Abstract

Nowadays, PCI with stent implantation is regarded as a tremendously applied myocardial revascularization procedure. Sadly, today, negative cardiovascular clinical results appear notwithstanding proved stability and efficiency after implantation. Executing drug-eluting stents (DES) has positively brought about a considerable change regarding restenosis. Generally, the coronary tree seems to be influenced by more significant coronary artery disease (CAD) pharmacological therapy and comprehensive secondary mitigation steps. Study's purpose: The present study attempts to investigate the main unfavorable cardiac issues and one-year consequences after PCI. Patients and Methods: The current research is a cross-sectional study of all cases referred to the Iraqi Center for a heart condition for more assessment of suspected coronary artery disease (CAD) as of January to July 2018. There were fifty (50) altogether. Results: There were 50 patients in total; their average age was 59.1±11.3, (22%) were under 45 and (78%) equal and over age 45 years. The group comprised nearly 46% female, and 54% were male. The frequency risk factors were Dyslipidemias (52%), Obesity (21%), DM (62%), HT (56%), and Smoking (21%). The most typical clinical presentations were chronic stable angina (98%) and one case (2%) severe coronary syndrome. The outcome of PCI following a year was broken into four separated classifications; the first group (A) involved cases with ISR (5/50) (10%), the second group (B) involved cases with new stenosis (8/50) (16 %), the third group (C) consisted of cases combined lesions (16/50) (32%) and finally, the fourth group (D) (21/50) (42%) cases were normal. Conclusion: there was a high frequency of recurrence of symptoms exceeding half of the cases following a year from PCI, the majority of them because of growth of new lesions.

Keywords: percutaneous coronary intervention, revascularization, drug-eluting stents, coronary artery disease, pharmacological therapy.

Resumen

Hoy en día, la ICP con implante de stent se considera un procedimiento de revascularización miocárdica de gran aplicación. Lamentablemente, hoy en día, los resultados clínicos cardiovasculares negativos aparecen apesar de la estabilidad y eficacia probadas después de la implantación. La ejecución de stents liberadores de fármaco (SLF) ha supuesto un cambio considerable en la reestenosis. En general, el árbol coronario parece estar influenciado por una terapia farmacológica más significativa de la enfermedad de las arterias coronarias (CAD) y por pasos secundarios integrales de mitigación. Objetivo del estudio: El presente estudio intenta investigar los principales problemas cardíacos desfavorables y las consecuencias de un año después de la ICP. Materiales y métodos: la investigación actual es un estudio transversal de todos los casos remitidos al Centro Iraquí por una afección cardíaca para una evaluación más detallada de la sospecha de enfermedad de las arterias coronarias (CAD) entre enero y julio de 2018. Hubo cincuenta (50) en total. Resultados: Fueron 50 pacientes en total; su edad promedio era 59,1 ± 11,3, (22%) eran menores de 45 años y (78%) iguales y mayores de 45 años. El grupo estaba compuesto por casi un 46% de mujeres y un 54% eran hombres. Los factores de riesgo de frecuencia fueron Dislipidemias (52%), Obesidad (21%), DM (62%), HTA (56%) y Tabaquismo (21%). Las presentaciones clínicas más típicas fueron angina estable crónica (98%) y un caso (2%) síndrome coronario severo. El resultado de PCI después de un año se dividió en cuatro clasificaciones separadas; el primer grupo (A) involucró casos con ISR (5/50) (10%), el segundo grupo (B) involucró casos con nueva estenosis (8/50) (16%), el tercer grupo (C) consistió en casos lesiones combinadas (16/50) (32%) y finalmente, el cuarto grupo (D) (21/50) (42%) casos fueron normales. Conclusión: hubo una alta frecuencia de recurrencia de síntomas superior a la mitad de los casos después de un año de ICP, la mayoría por crecimiento de nuevas lesiones.

Palabras clave: intervención coronaria percutánea, revascularización, stents liberadores de fármacos, enfermedad arterial coronaria, terapia farmacológica.

Introduction

The most commonly utilized myocardial revascularization method is percutaneous coronary intervention (PCI) with stent implantation. In spite of the proven viability and effectiveness of PCI, following stent implantation, adverse cardiovascular clinical effects do arise, impairing the short-and long-term result. Traditionally, the operation is related to cases arising during the 1st month after PCI and called periprocedural, while those that occur later emerge either from the stented (target) lesion or from disease development at other locations in the coronary tree[1,2]. Important advances in stent implantation procedures have been achieved over the last decade. The invention of drug-eluting stents (DES) and their widespread use also contributed to a major change in the issue of restenosis. Continuous improvement of the configuration of the stent, the eluted medication and its delivery mechanisms and the adjunctive antiplatelet pharmacotherapy, A substantial part of the interventional cardiology literature was taken up, reflecting the importance paid to the stented site care. In the other hand, increased pharmacological management of coronary artery disease (CAD) and intensive secondary prevention interventions (e.g. alteration of risk factors) tend to affect the coronary tree as a whole. New research on the role of disease development as a cause of late-post-PCII events[2-6].

Stent implantation PCI can lead to in-stent restenosis (ISR) and stent thrombosis (ST) ISR is a major concern for DES, but with a greatly decreased incidence, primarily for bare metal stents (BMS) and ISR. ST is an unusual complication of similar occurrence in DES patients and those with BMS. Although rare, ST is frequently related to serious symptoms, including mortality and myocardial infarction. Most prominently, there has been proof that there could be a link between the course of sickness and ISR. Progression of atherosclerotic disease beyond the stented coronary segment will contribute to the growth of localized plaque. It has been recognised that coronary lesions found during PCI that are initially non-culprit will easily grow into clinically important lesions[17,18].

Traditional risk factors for CAD are fairly assumed to be consistent with disease development in non-standard parts. The slowest CAD development was found in patients with low low-density lipoprotein (LDL) and normal systolic blood pressure. The most significant major cardiovascular disease predictor for disease development is baseline diabetes. The determination of unique plaque features predictive for potential angiographic and clinical development is a difficult problem. In vitro imaging of the fragile plaque was primarily defined using invasive techniques. Angioscopy provides a clear visualization of the plaque, allowing the surface to be analyzed and tears and thrombi to be identified. It is difficult to conduct and confined to the proximal portion of the vessels in its application. Morphological research, mainly autopsy studies, show that the precursor to ruptured plaque is thin cap fibroatheroma (TCFA)[26]. In contrast to in vitro histopathology, IVUS virtual histology is a promising modality of vulnerable plaque diagnosis that is highly reliable. For deceleration of disease development or even reversal of atherosclerotic lesions, intensive global risk adjustment in patients with CAD is of vital significance. Statins have been identified in order to increase the clinical outcome of patients with stable CAD and acute coronary syndromes following PCI. The relevance of lifestyle and post-PCI pharmacological treatments is stressed in the latest CAD secondary preventive guidelines). In statin-treated patients, IVUS trials revealed reversal or no worsening in coronary plaque in statin-treated patients and substantial improvements in the volume of the necrotic heart and fibrofatty plaque[36].

Post-PCI dual antiplatelet therapy is commonly offered specifically to prevent stent thrombosis. Patients with reported previous MI, ischemic stroke, or symptomatic peripheral artery disease have also been found to benefit from clopidogrel and aspirin administration. In real-world clinical experience, the execution of secondary preventive strategies is sometimes frustrating. Despite appropriate risk modification and modern pharmacological care, CAD also advances over time[40].

Results

Study's aim

To examine the significant adverse cardiac events and one-year consequences after PCI.

Patients and Methods

This is cross-sectional study conducted at Iraqi Center for Heart disease (ICHD), all patients who were referred to ICHD for the period from January to July 2018, were included. The total No. of patients was fifty; the demographic characteristics for all patients were recorded, including, age, gender, conventional cardiovascular risk factors, BMI.

All patients had history of revascularization with PCI one year ago whom complaining chronic stable angina except one patient complain ACS are underwent coronary angiography included in this study. Any patient considered to be diabetics if has one of American Diabetic Association diagnostic criteria, FBS (8 hr fasting) equal or above 126mg(7mmol), 2hr post prandial equal or above 200mg(11mmol), RBS above 200mg in patient with characteristic symptoms of DM or HbA1C equal or above 6.5% was considered to be diabetic. Any patient with blood pressure equal or above 140/90 for more than three

reading or on antihypertensive medication was considering being hypertensive. Any patient who smoked greater than 100 cigarettes in their life time and has smoked in the last 28 days was considering being smoker.

Dyslipidemic refer to any patient has fasting total cholesterol above 200 mg and or triglyceride above 150 mg. Coronary Angiographic notes reviewed. Single vessel disease was considered present if there was more than 70 % diameter stenosis on visual assessment in the left anterior descending (LAD), left circumflex (LCX), right coronary (RCA) arteries, or ≥ 50 % left main stenosis or for in-stent restenosis of the stented artery.

Post-procedure access sheaths were removed with use of compressors. All patients were followed-up until discharge. The access site was examined for any local complications. Discharged patients were given clinic follow-up appointments.

Regarding the coronary angiography:
The procedure is done under local anesthesia. Preoperative tests including renal function, viral screen, baseline resting ECG, few hours fating before the test, record any history of asthma, drugs or contrast allergy, half evening and withdrawal of morning dose of anti-diabetic drugs. The procedure done by insertion of 6Fsheath through femoral or radial artery access (Sildenger technique), injection of contrast in RT and LT coronary artery by 6F 90-110 cm diagnostic catheter, the procedure end within 20 -30min ,the patient remain under observation, and sheath removed few min after the end of the procedure with pressure on the site of sheath insertion for 15-30 min, avoid movement out of the bed for at least 4hrs, then the patient can be discharge if no complications.

Statistical analysis
SPSS version 23 was used for data entry and analysis. Frequency, percentage, and figures were used to represent categorical data. Chi-square test (fisher exact test if not applicable) tests was used to confirm significance.p ≤ 0.05 considered significant.

As shows in the table 1 the characteristics of the patients were the total No. of patients were 50, mean age was 59.1±11.3, eleven (22%) were below age 45 and thirty nine (78%) equal and above age 45. Twenty seven (54%) were male and twenty three (46%) were female. The frequent risk factors were as follows: DM: thirty-one (62%), HT: twenty eight (56%), Dyslipidemias: twenty six (52%), Obesity: twenty one (21%) and Smoking: twenty one (21%)

The most common clinical presentations were chronic stable angina in forty nine cases (98%) and one case (2%) acute coronary syndrome. Forty one (82%) cases were treated by PTCA & DES and only nine cases (18%) treated by PTCA. Forty one (82%) cases were treated with DES.The frequent involved arteries were, LAD: thirty one (62%), RCA: thirteen (26%), LCX: four (8%) and LCX & LAD: two (4%)

Table 1. Baseline characteristics of the patients (n=50)

		(No, %)
Age groups		
	<45	11 (22%)
	≥45	39 (78%)
sex		
	Female	23 (46%)
	Male	27 (54%)
Risk factors		
DM	31 (62%)	
HTN	28 (56%)	
Dyslipidemias	26 (52%)	
Obesity	21 (42%)	
Smoking	21 (42%)	
Clinical presentation		
	ACS	1 (2%)
	CSA	49 (98%)
mode of treatment		
	PTCA & DES	41 (82%)
	PTCA	9 (18%)
Type of stent		
	DES	41 (82%)
Involved artery		
	LAD	31 (62%)
	LCX	4 (8%)
	LCX &LAD	2 (4%)
	RCA	13 (26%)

The outcome of PCI after one year shown in table 2 represented as four groups, group A: - five patients with ISR, group B: - eight patients with new stenosis, group C: - sixteen patients combined lesions and group D: - twenty one cases were normal. Age patients equal or more than 45 y statistically significant in group A(5/5) (100%) and group B(8/8) (100%), (P. value 0.04).Male gender statistically significant in group A (3/5)(60%) and group B (5/8) (62.5%), (P. value 0.03).Diabetes mellitus in group B and C (8/8) (100%),(14/16) (87.5%) respectively and dyslipidemia in group B and C (5/8) (62.5%), (14/16) (87.5%) respectively both statistically highly significant (P.value0.001).Hypertension (13/16) (81.3%) and smoking (12/16) (75%) statistically significant in group C (P. value 0.02).Obesity high frequent in group B (7/8) (87.5%) but statistically insignificant (P. value 0.08).

All patients presented with chronic stable angina (49/50) (98%) but only one case presented as acute coronary syndrome. The mode of treatment was PTCA in group A (3/5) (60%) and PTCA and DES in group B (8/8) (100%) (P. value 0.02).

The classification of coronary angiography findings after one year of PCI was shown in figure 1:-Late ISR in five patients (10%), new stenosis in eight patients (16%),Combined ISR and new stenosis in sixteen patients (32%),Normal angiography in twenty one patients (42%) and new alone plus ISR and new stenosis in twenty four patients (48%)

Table 2. distribution of clinical indices and the outcome angiographic findings after 1 year from PCI

Patient s(n=50)		post PCI out come								p-value
		Group A Late ISR (n=5)		Group B new stenosis(n=8)		Group C combined (n=16)		Group D Normal angiography(n=21)		
		No.	%	No.	%	No.	%	No.	%	
Age groups										
	<45	0	0.0%	0	0.0%	7	43.8%	4	19.0%	0.04
	≥45	5	100.0%	8	100.0%	9	56.3%	17	81.0%	
sex										
	F	2	40.0%	3	37.5%	11	68.8%	7	33.3%	0.03
	M	3	60.0%	5	62.5%	5	31.3%	14	66.7%	
Risk factors										
DM		3	60.0%	8	100.0%	14	87.5%	6	28.6%	0.001
HT		3	60.0%	5	62.5%	13	81.3%	7	33.3%	0.02
dyslipidemia		3	60.0%	5	62.5%	14	87.5%	4	19.0%	0.001
Smoking		2	40.0%	3	37.5%	12	75%	4	19.0%	0.02
Obesity		3	60.0%	7	87.5%	6	37.5%	6	28.6%	0.08
Clinical presentation										
	ACS	0	0.0%	0	0.0%	0	0.0%	1	4.8%	0.7
	CSA	5	100.0%	8	100.0%	16	100.0%	20	95.2%	
Mode of treatment										
	PTCA	3	60.0%	0	0.0%	6	37.5%	0	0.0%	0.02
	PTCA &DES	2	40.0%	8	100.0%	10	62.5%	21	100%	

Fig 1. Angiographic lesion after 1 year post PCI

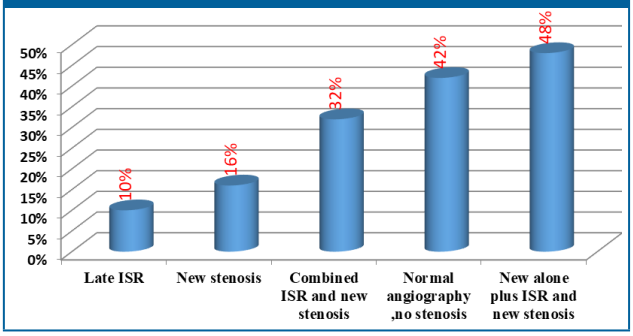

Table 3 LAD artery was most involved in seventeen (17/29) (58.6%) of the patients which is statistically significant (P. value 0.02).

Table 3. Distribution of coronary lesion on 3 major vessels

	ISR +with or without new lesion(n=29)	%	p-value
LAD	17	58.6	0.02
RCA	9	31.0	
LCX &LAD	2	6.9	
LCX	1	3.5	

Twenty of twenty-four (83.7%) patients with either new stenosis or Combined ISR and new stenosis had multiples risk factors which is statistically significant (P. value 0.03), table 4.

Table 4. Relation of new lesion and number of risk factor

	No.	%	p-value
Single risk factor	4	16.7	0.03
Multiple risk factors	20	83.7	
Total	24		

Relation of risk factors and development of new lesion after 1 year post PCI. Nineteen dyslipediamic patients (19/24) (79.1%) had new lesion with or without ISR was highly statistically significant (P. value 0.01). twenty-two (22/24) (91.6%) of the patients who had new lesion with or without ISR had DM was significantly (P. value 0.03). Both HT and smoking (75%), (62.5%) respectively had same statistically significant (P. value 0.04). thirteen of the patients (13/24) (54.1%) who had obesity show no statistically significant (P. value 0.06) correlation in development of new lesion. All results were summarized in Table 5.

Table 5. Relation of risk factors and development of new lesion after 1 year post PCI

	New lesion with or without ISR(n=24)	No lesion at all (n=21)	p-value
DM	22 (91.6%)	9 (42.8%)	0.03
Dyslipidemia	19 (79.1%)	7 (33.3%)	0.01
HTN	18 (75%)	10 (47.6%)	0.04
Smoking	15 (62.5%)	6 (28.5%)	0.04
Obesity	13 (54.1%)	8 (38.1%)	0.06

Late ISR was excluding

Discussion

Hypertension was the predominant risk factor (82.0%) in the National Cardiovascular Data Registry (NCDR) registry followed by diabetes mellitus (36.0%)[41]. In the Swedish Coronary Angiography and Angioplasty Registry (SCAAR) registry the mean age was 67 years[42]. In Prashanth P et al[43] study the mean age was 58.2±11.2 years. In our study the male were (74.3%),the female were (25.7%), the predomi-

nant risk factor was dyslipidemia (66.8%) followed by HTN (55.1%) then DM (45.9%) and smoker (20%), our study, in ICHD mean age was 59.1±11.3 patients 78% age ≥45y and 54% male. DM was the predominant risk factor (91.6%) followed by HTN (56%) and dyslipidemia (52%) This was not accordance with the study done by Prashanth P et al[42] and the NCDR registry[41]. In the NCDR, approximately 70.0% had ACS at presentation[41]. In the SCAAR, ACS was the reason for 78.0% of PCI[42]. The study done by Prashanth P et al, approximately (30.7%) had ACS at presentation, and (24.1%) of the patients had CSA[43]. In our study, 95.2% of reangiogragphy of the patients had CSA, that varies from data from the Western registry. This discrepancy may be attributed to the high number of ACS patients attending immediate PCI in the US and European Registries, the lack of primary PCI output at our Institute, and the lack of catheterization facilities accessible at peripheral hospitals for patients with thrombolysed STEMI moved to our PCI Institute. Pereira H et al and Papaioannou GI et al, study, DES were used in about 75.0% of patients[44,45] while in Prashanth P et al study there was 88.4%[46]. in our study 82% DES used This is due to the only type available in the our hospitals and market. Atherosclerosis of coronary arteries is a common phenomenon seen to be prevalent worldwide. Similar to our study of analytical study conducted in India, in which 350 adult patients having mean age range between 40-60 years referred to diagnostic catheterization on suspicion for coronary artery disease, lesion in coronary arteries revealed that out of 213 cases showing the occlusion, the most common artery to show a block was LAD 162 (76%), followed by RCA 92 (43%). The least common vessel to show an occlusive lesion was left main coronary artery (LMCA)[47].

The left anterior descending artery (LAD) is the most commonly involved vessel in coronary atherosclerosis. In our study, LAD was the most common artery involved in 17 (58.6%) followed by the RCA 9 (31%). This was in accordance with the study done by Chen Shao Liang[48] which also showed the LAD to be the most commonly involved vessel in occlusive lesion 54(40.9%) followed by RCA 51(38.6%). A similar view was shared by J Golshah[49] who found most lesions to be located in LAD (19.6%) followed by the RCA (13.7%).

The anterior descending artery has been considered as the artery most frequently and severely affected by the atherosclerotic process. However the study done by G G Gensini[50] showed the RCA to be most commonly involved vessel by the occlusive lesion 91(91%) followed by LAD 83(83%). Our study consistent with result of the study by Roever. L et al on the association of DM and atherosclerosis demonstrate that Insulin resistance (the hallmark of type 2 diabetes mellitus) A cluster of diseases (dyslipidemia, hypertension, obesity, glucose resistance, metabolic syndrome and endothelial dysfunction) are linked with metabolic and cardiovascular disorders, each of which is an individual risk factor for cardiovascular disease and demonstrate that food, exercise and drug treatment mobilizes fat from tissues, contributing to enhanced insulin sensitivity, enhanced functioning of beta cells[51].

A study by Robert H et al the apolipoprotein localization in human cranial, extra cranial arteries, coronary arteries and the aorta, 35 patients the outcome were 65% of the plaque and 67% of fatty streaks demonstrated superposition of apolipoprotein and lipids suggest the impact of hyperlipidemia on progression of atherosclerosis[52].

Conclusions

After one year from PCI there was high frequency of recurrence of symptoms exceeding half of the patients, most of them due to development of new lesion.

Recommendations

Strict control for dyslipidemia status post intervention is recommended

We should plan further study in large sample size of patients.

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