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Impact of "Ad Hocpercutaneous Coronary Intervention in a Single Cardiac Center

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Abstract: ***Background****: Percutaneous Coronary Intervention (PCI)may be performed during the same session as diagnostic catheterization (Ad hoc PCI)or at a late session (delay or staged PCI).In spite of "Ad hoc PCI is commonly performed all over the world Still A few studies have examined predictors and outcomes of this procedure*
Objective*: Todefine factors which limit the use of "Ad hoc strategy and to assess the safety and outcome in compare with "Staged strategy*
Patient and Methods: All patients who underwent PCI at Al-Nasiriyah Heart Center in 2016- were reviewed in cross-sectional study .PCI is performed at the same day as diagnostic catheterization were consider as"Ad hoc; the others consider as "staged PCI .Early complications including (procedural success, occurrence of death and new non-fatal MI)were observed
Results*:A 152 patients enrolled in this study .Seventy –two of them underwent "Ad hoc Percutaneous Coronary Intervention and 80 patients underwent elective "staged Percutaneous Coronary Intervention. Mean age of "staged PCI was 58.30±4.8 while 48.21±3.7 in "Ad hoc.Most patients of "Ad Hoc PCI group are presented with unstable angina(56.9%) , whereas stable angina predominates in the staged PCI group(27.5%).Multivessel PCI was more frequent in the "staged group than in the "Ad hoc group. The success rate of PCI similar in both groups .Procedural angiographic complications less in "Ad hoc in compares to "staged PCI (6.8% ,11.25% respectively)*
Conclusions*: "Ad hoc PCI can be performed safely for the majority of patients with ischemic heart diseases ,With less overall incidence of post PCI complication in spite of that " staged PCI strategy still a wise option in high risk group patients*
Keywords *: coronary artery diseases ,Ad hoc PCI, short term outcome*

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I. Introduction

To reduce the cost and patient preferred more PCI being done immediately following diagnostic catheterization (Ad hoc) which is a Latin phrase.[1] This approach was uncommon in the early years of PCI when most procedures were performed days to weeks after the initial diagnostic test.[2]As PCI became safer and more predictable, it was more often performed during the same session as diagnostic catheterization [3] this strategy become more popular and now most of PCI are Ad hoc PCI worldwide .There has been a tendency to improve efficiency by performing PCIs immediately after cardiac catheterization (ad hoc PCIs) [4]. disadvantagesof this procedureinclude: An abbreviatedinformed patient consent process, The need for immediate decision making by medical professionals and difficulties obtaining surgical backup [5]. Guidelines and appropriate use criteria for PCI are frequently being revised, [6, 7]What we need for AD HOC PCI include the followings : Informed Consent [8], Availability of data to determine the appropriateness of PCIand Tools for the assessment of periprocedural patient risk (short-term and long-term). [9] in addition to Pretreatment which include dual antiplatelet therapyalthough they can be also administered at the time of PCI, (Prasugrel).[10,11]

II. Patients And Methods

A cross-sectional study was including One hundred fifty two patients ,those who underwent cardiac catheterization and Percutaneous Coronary Intervention during hospitalization in Nasiriyah Heart Center in 2016 . Seventy two patients underwent "Ad hoc Percutaneous Coronary Intervention and eighty patients underwent elective "Staged Percutaneous Coronary Intervention.

The database used in the study contains detailed information for each patient undergoing PCI in the state on demographics; dates of admission, procedure, and discharge; pre-procedural risk factors; type of IHD at presentation and main symptoms; hemodynamic status of patients and any serious arrhythmias. For all the patients, ECG and Echocardiography were done

PCI was typically performed with 6 Fr guide catheters, heparin anticoagulation, and vascular closure usually with a manual compression or in some cases intra-arterial collagen plug device. Drug-eluting stents (DES) were used in approximately 95% of patients. Clopidogrel was usually first administered as a 300-600 mg loading dose the day before procedure. After PCI, all patients spent at least couples nights in the hospital.

If the cardiologist agreed that PCI was the best strategy, this recommendation was discussed with the patient. The patient was given the choice of proceeding immediately, or leaving the catheterization laboratory to further consider options for treatment or consult with family members.

If a decision for PCI was reached on the same day, the patient was returned to the catheterization laboratory for PCI. When decisions required more time, PCI was scheduled on a different day.

After the procedure, all the patients were checked for cardiac enzyme(troponine) sampling at 24 hours or earlier if the patient becomes symptomatic.Patients were discharged on dual antiplatelet (aspirin 100 mg and clopidogrel 75 mg), in addition to anti-ischemic and lipid-lowering drugs.

Procedural success was defined as <30% residual diameter stenosis; and clinical success was defined as procedural success without hospital complications (death, Q wave myocardial infarction, or target vessel revascularization). Target vessel revascularization was defined as the revascularization of the vessel formerly treated by PCI during the index hospitalization by a repeat percutaneous intervention or bypass surgery. Emergency coronary artery bypass grafting (CABG) was defined as CABG performed within 24 hours after the index percutaneous procedure(.[1º])

Early outcomes (in-hospital period) after PCI, including procedural success, occurrence of death and new non-fatal MI, post-PCI angina, stent thrombosis, subsequent revascularization within 48-hour of the index procedure, and subsequent target vessel revascularization with PCI or CABG surgery were compared between the two groups.

III. Results

Frequently found patients age in "staged PCI older than "Ad hoc PCI group (0.0001),Heart failure and LV systolic dysfunction was more in staged PCI in compare with Ad hoc PCI (20%, 39% - 5.6%,11.7% respectively). All statically significant as shown in table 1

Table 1. Demographic data of studied participants

	Ad Hoc PCI N=72	Staged PCI N=80	p-value
Age (year):mean (±SD)	48.21±3.7	58.30 ±4.8	0.0001*
History of diabetes mellitus	23(31.94%)	30(37.5%)	0.473§
Hypertension	28(38.9%)	31(38.75%)	0.986§
Hypercholesterolemia	40(55.56%)	48(60%)	0.579§
Smoking	45(62.5%)	58(72.5%)	0.1878§
Family history of(coronary artery diseases)CAD	16(22.22%)	23(28.75%)	0.3575§
Previous myocardial infarction	0.00 (0%)	12 (15%)	N/A §
Unstable Angina	30(41.67%)	35(43.75%)	0.795§
History of congestive heart failure	4(5.6%)	16(20%)	0.0085§
Peripheral vascular disease	6(8.33%)	13(16.25%)	0.109#
Pre-procedure Renal function impairment	2(2.8%)	9(11.25%)	0.041#
Cerebrovascular disease	1(1.39%)	3(3.75%)	0.351#
Left ventricle(LV) Ejection Fraction: mean (SD)	54.0 (11.7)	39.0 (11.0)	<0.0001*
Pre-procedure Arrhythmia	6(8.33%)	9(11.25%)	0.3727#
*Two-Sample t-test. § Chi-Square test. # Fisher's exact test.			

Table 2 shows the main presentation in those patient with Ad hoc PCI unstable angina 41 from 72 patients (56.9%) while stable angina is the dominant presentation in patient with staged PCI(27.5%) ,all statistically significant

Table 2. Distribution of studied groups according to their presentation.

Presentation	Ad Hoc PCI N=72	Staged PCI N=80	p-value
Atypical chest pain	4(5.56%)	6(7.50%)	0.749*
No symptoms (no angina)	4(5.56%)	7(8.75%)	0.540*
Stable angina	10(13.89%)	22(27.50%)	0.039*
Unstable angina	41(56.94%)	27(33.75%)	0.004*
Non-STEMI	11(15.82%)	14(17.50%)	0.712*
Late presentation after STEMI	2(2.78%)	4(5.00%)	0.683*
* Fisher's exact test.			

Significant association is present regarding number of vessels involve in both strategies 23.75% in staged PCI verses 5.5% in Ad hoc PCI (p0.001). Chronic Total occlusion was 8,75% in staged while it was 2.7% in Ad hoc with significant relation (0,008) .Use of contrast media was higher in staged PCI in compare to Ad hoc PCI(270.3 ml ,380.6 ml respectively)(p0.000) ,success procedure shows no mark difference between two strategy as shown in table 3

Table 3. Angiographic and procedural details.

	Ad Hoc PCI N=72	Staged PCIN=80	p-value
Number of vessels diseased			0.0005
One vessel without proximal LAD	35(48.61%)	16(20.00%)	0.0002
One vessel with proximal LAD	11(15.28%)	13(16.25%)	0,869
Two vessels without proximal LAD	12(16.67%)	12(15.00%)	0.778
Two vessels with proximal LAD	10(13.89%)	20(25.00%)	0.085
Three vessels	4(05.56%)	19(23.75%)	0.0017
Lesion type		7(8.75%)	0.008
Chronic total occlusion	2(2.78%)		
Coronary artery having critical lesion and revascularized			0.564
LAD		25(31.25%)	0.292
LCX	17(23.61%)	29(36.25%)	0.493 0.772
RCA	30(41.67%)	26(32.50%)	
	25(34.72%)		
Number of lesions treated per patient			0.0008
One lesion	55(76.39%)	38(47.50%)	0.292
Two lesions	15(20.83%)	32(40.00%)	0.493
Three lesions	2(2.78%)	10(12.50%)	0.772
Preintervention (percent stenosis):mean(SD)	80.0(11.0)	81.9(10.6)	0.280
Number of stents			0.036 0.045
1 stent	45(62.50%)	37(46.25%)	0.576 0.022
2 stents	23(31.94%)	29(36.25%)	
3+ stents	4(5.56%)	14(17.50%)	
Total length of stents mm(average):mean(±SD)	26.2(±14.7)	29.4(±23.6)	0.32
Total length of stents mm(average) in LAD: mean(±SD)	23.7(±20.8)	32.0(±25.7)	0.723
Postintervention (percent stenosis):median[range]	10.0[0.0- 30.0]	15.0[0.0-35.0]	N/A
Successful procedure	72(100%)	78(97.5%)	N/A
Contrast(ml):mean(SD)	270.3(160.5)	380.6(141.1)	0.00001
Coronary angiography	--	130.7(40.2)	
Staged PCI	--	250.1(157.8)	

In table 4 , total procedural complications little bit more frequent in Staged PCI than Ad hoc PCI with significant association, while other complications like slow flow , perforation and dissection looks no big difference except no reflow which is more in staged PCI than Ad hoc with significant relation (p0.3)

Table 4. Intraprocedural complications.

	Ad Hoc PCI (N=72)	Staged PCI (N=80)	p-value
AnyIntraprocedural complication	5(6.94%)	9(11.25%)	0.411*
Dissection	1(1.39%)	1(1.25%)	1.000*
No-reflow	1(1.39%)	4(5.00%)	0.370*
Final stenosis >50%	0(0.0%)	1(1.25%)	N/A*
Any slow flow during procedure	2(2.78%)	2(2.50%)	1.000*
Perforation	1(1.39%)	1(1.25%)	1.000*
* Fisher s exact test.			

In general the total Complications during hospitalization(before discharge) were obvious in staged PCI (14 OUT OF 80 Patients (17.5%) with significant relation in comparing to Ad hoc strategy(p0.01) . Anginal chest pain and vascular complications at access site were more in staged PCI verses Ad hoc PCI without significant association as shown in table 5

Table 5. Complications before discharge (immediate outcome).

	Ad Hoc PCI (N=72)	Staged PCI (N=80)	p-value
Any post-procedure complication	3(4.17%)	14(17.50%)	0.010*
Peri-procedural ischemia	0(0.0%)	6(7.50%)	N/A*
Anginal chest pain	--	4(5.0%)	
Periprocedural myocardial infarction	--	2(2.50%)	
Renal impairment	0(0.0%)	2(2.50%)	N/A *
Stroke	0(0.0%)	0(0.0%)	N/A *
Congestive heart failure	0(0.0%)	2(2.50%)	N/A *
Emergency CABG	0(0.0%)	0(0.0%)	N/A*
Death	0(0.0%)	0(0.0%)	N/A*

Any vascular complication at access site			
Bleeding	3(4.17%)	4(5.00%)	0.886*
Pseudoaneurysm	2(2.78%)	2(2.50%)	1.000*
Loss of distal pulse	0(0.0%)	0(0.0%)	N/A
Arteriovenous fistula	0(0.0%)	0(0.0%)	N/A
Dissection	0(0.0%)	0(0.0%)	N/A
Occlusion	1(1.39%)	2(2.50%)	0.926*
	0(0.0%)	0(0.0%)	N/A
* Fisher's exact test.			

The other important finding of this study involves the causes for staging PCI procedures. Of 80 staged procedures, one-fourth (22 patients) were staged because the operator felt that information obtained during the diagnostic angiography required re-consideration of alternatives to PCI. Eight others were referred for CABG, but underwent PCI after one or more cardiac surgeons declined to perform bypass surgery because of excessive risk. Of the remaining 50 patients in whom PCI was staged, 18 were not planned, but became necessary due to recurrent or intractable angina despite medical therapy. Sixteen patients were deferred due to concerns over excessive contrast or radiation exposure. Twelve PCI procedures were deferred due to complications related to the vascular access site that occurred during diagnostic angiography, which were thought to increase the risk of vascular access bleeding unacceptably if anticoagulants were given during the PCI. In 4 patients, intracoronary assessment of the lesion with a pressure wire was not feasible, and PCI was deferred until further testing could confirm the physiologic significance of the lesionas shown in table 6

Table 6: Reasons for non-ad hoc PCI staging.

Groups	Number of patients (%)
1) Additional discussion and informed consent concerning diagnostic findings required before PCI.	22(27.50%)
2) CABG recommended after diagnostic angiography, but declined by a cardiac surgeon.	8(10.00%)
3) Second stage done due to recurrent or intractable angina.	18(22.50%)
4) Complications during the diagnostic procedure that would have made PCI unsafe if undertaken on the same day.	12(15.00%)
5) Contrast/radiation that would have been excessive if done on the same day.	16(20.00%)
6) Second stage done only after additional testing provided a clear indication.	4(5.00%)
Total	80(100%)

IV. Discussion

Patients receiving ad hoc procedures in This study were of lower risk on average (younger, with higher ejection fractions, less likely to have suffered a previous myocardial infarction, and less likely to have important comorbidities as CHF or renal impairment) and most patients are presented with unstable angina.

These findings are similar to Good et al [(12)] results that reported the outcomes of 580 PCIs in 2004 from a single center and found that delayed PCI patients were older with a higher frequency of prior MI, congestive heart failure, chronic kidney disease, left ventricular systolic dysfunction, and prior CABG.

Strategy of ad hoc (rather than staged) PCI, as employed at this center, does not appear to compromise patient safety. Procedural success occurred with almost equal frequency in ad hoc and staged PCIs. There is higher frequency of multivessel disease, more involvement of proximal LAD, higher incidence of chronic total occlusion, and higher number of lesions treated in the staged PCI, for whom Ad hoc PCI cannot be the default strategy. There was a trend toward more complications (intraprocedural and postprocedural) in staged patients, largely due to higher incidence of periprocedural ischemia compared to ad hoc PCI patients. Review of the staged PCI patients indicates that most patients are high-risk that was more likely to have complications due to their underlying disease. Our findings confirm those of Hannan et al [(13)], who reported that compared to staged PCI, ad hoc PCI was not associated with a lower success rate or more frequent complications. Study of 349 patients in al Basra cardiac center reveals ad hoc PCI is of comparable procedural success rate with less complication[(14)] . While Chenfei Rao,et al[(15)] study shows ad hoc procedure associated with high rate of revascularization.

In our analysis, there was no significant difference in the overall incidence of peripheral vascular complications between the two study groups. This can be explained by the occurrence of bleeding at the access site in two cases of Ad Hoc PCI with high thrombus burden for whom abciximab infusion was used. This is in contrary to Shubrooks et al [(16)] who reported more complications with staged PCI (1.5%) than ad hoc PCI (0.6%, p = 0.006), attributed primarily to more frequent vascular complications associated with need to re-access the femoral artery, and Feldman et al. [(17)] who reported that staged patients trended toward a higher rate of site access site injury (adjusted OR: 1.34, 95% CI: 0.99 to 1.81)"

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