

Complete and Incomplete Revascularization of patients with Non-ST-Elevation Acute Coronary Syndrome using Angioplasty and Stenting.

Hassan U. Al-Najjar * DCC, FRCPI

Summary

Background: Angioplasty and stenting; Percutaneous coronary intervention (PCI) has become important tool of Revascularizing patients with stable angina and Acute ST-Elevation Myocardial Infarction, while their role in Non ST-elevation Acute coronary syndrome is expanding. The aim was to study the outcome of complete and incomplete Revascularization, by PCI, of pts with NSTEMI-ACS, and the effect of the traditional risk factors and their relation to the number of stents.

Patients and Methods:- After stabilization 115 out of 142 consecutive hospital admissions with Non ST-Elevation Acute Coronary Syndrome were revascularized Percutaneously.

Results:- Apart from two pts, who had advanced disease, PCI had succeeded in revascularizing the remaining 113 pts, (98%); 93 of them had Complete revascularization (81%) with elimination of all stenotic lesions, while 20 pts had Incomplete Revascularization The later consisted of fifteen Patients who had dilatation of the culprit lesion/s only (group a) and 5 pts who had dilatation of all lesions except uncrossable lesion/s despite painstaking attempts (group b). cardiac events:-Five of the 93 pts with complete revascularization (5.4%) had Major Cardiac Events compared to 4 of the 15 pts in group a; Culprit-lesion-only Revascularization (27%), suggesting that leaving behind angioplastable lesion/s might not be feasible, yet the sample is small. Risk Factors:- The likelihood of achieving Complete Revascularization was inversely linked the no. of risk factors. It had dropped from 100%, to 85%, 79%, and 67% in pts with nil, 1, 2, and 3-5 Risk Factors respectively. Conversely the no. of stents deployed was directly linked to the number of Risk Factors reflecting a more severe underlying disease.

Conclusion: Early PCI in had achieved complete revascularization of 81% of pts with NSTEMI-ACS. Complete Revascularization was associated with much lower Major Cardiac events than Revascularization of the Culprit lesion only. Frequency of Complete revascularization had proportionately increased with the no. risk factors reaching 100% in without risk factors (100%). The no. stents had proportionately increased with the no. of Risk factors suggesting more severe underlying disease.

Key word: Angioplasty and stenting = Percutaneous Coronary Intervention =PCI, Non-ST-Elevation Acute Coronary Syndrome = NSTEMI- ACS, Coronary artery Bypass grafting = CABG, Major Cardiac Events = MACE

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Introduction

Acute Coronary syndrome is a serious manifestation of atherosclerosis. It is associated with considerable morbidity and mortality (1). It is responsible for 1.4 millions admissions to hospital in the United States every year (2). Revascularization by percutaneous balloon intervention is the cornerstone of treatment of patients with chronic stable angina and those with Acute ST-Elevation Myocardial infarction (3-7). The role of early PCI in the treatment of Patients with Non-ST-Elevation Acute coronary syndrome is expanding. The fact that this Syndrome includes a wide spectrum of patients with various grades of severity has resulted in variable outcome of revascularization by PCI. We aimed at studying the hospital outcome of early Angioplasty and stenting in this group of pts with Non-STEMI.

Acute Coronary syndrome and explore the relationship of achieving complete Revascularization or incomplete Revascularization and Inhospital Major Cardiac Events and to see if achieving complete Revascularization was affected by the number of five classical predisposing Risk Factors i.e. Hyperlipidaemia, Hypertension, Diabetes Mellitus, Smoking, and Family History of IHD. In addition we assessed the relation of those risk factors to the no. of stents deployed.

Patients and Methods

The data of 173 patients admitted to Dallah Hospital in Riyadh, Saudi Arabia, between 1998 and 2002, with Non-ST-Elevation Acute Coronary syndrome were analyzed. Thirty one pts were excluded for having incomplete data. The traditional Risk Factors were; Hyperlipidaemia (HL); > 200mg/100ml = 5.0

* Dep. Of Medicine, Medical City

MMOL/L), Diabetes Mellitus (D.M.), Hypertension (HTN), Smoking (SM), and Positive Family History for Ischaemic heart Disease (PFH). The diagnosis is based on typical presentation and course. Typical presentation with characteristic chest discomfort /pain that is poorly localized in the anterior chest or left arm .The symptom has at least one of the following features. It occurred on minimal exertion or at rest and usually lasts for up to 20-30 minutes. The pain response to sublingual Nitroglycerine is not usually prompt (It usually needs larger dose). The pains had crescendo pattern being severe, prolonged, and more frequent than previously. The pain was usually much longer in pts with Non-ST-elevation Myocardial Infarction (NSTEMI). The diagnosis of NSTEMI required the confirmation of cardiac muscle necrosis by Cardiac enzymes elevation.

The pts with UA were classified into three groups of progressively worsening ischaemia based on their predominating clinical findings during hospitalization. The three groups were; New-onset Unstable Angina, group 1; 27 pts. Deteriorating Chronic Angina, group 2; 28pts. Rest Angina, group 3; 33 pts.

The classification was inspired by Eugene Braunwalds 1989 but it did not comply with it strictly because the no. pts without chest pain during the last 48 hrs was too small.

D-The patients with NSTEMI (27 pts) were regarded as group 4

All Pts with suspected Non-ST-elevation Myocardial Infarction and most pts with UA were admitted to the Coronary care unit. Some pts with Unstable Angina were admitted to the intermediate care unit when the Coronary Care Unit is full. All pts were given the standard treatment with nitrate and Heparin infusion, Aspirin, Beta blockers, and Statins. AC-Inhibitors were given to pts with LV dysfunction. Abciximab was given to some pts with Non-ST-elevation Myocardial Infarction and UA during catheterization with possible intervention in the presence of a thrombus. Coronary angiography was done, during hospitalization aiming at providing early revascularization. The pts were managed according to the clinical background and the angiographic findings along one of three lines of management;

1- Medical Treatment 10 pts.

2-Coronary bypass grafting, 17 pts

3- Percutaneous Coronary Intervention PCI, 115 pts; 81%. This group constituted the material of this study .Percutaneous Coronary Intervention was performed following the diagnostic catheterization (in one session) or soon after. QCA was used to measure the lesion length and severity however in borderline cases intra vascular ultrasound was used. The standard interventional treatment (then) was followed such as prior treatment with Ticlopidin /clopidogrel and heparinization during the procedure.

Inhospital Major Cardiac Events during hospitalization included: -

Recurrent Angina, Acute Transmural or Non-STE-Myocardial Infarction, Significant Arrhythmias, and other cardiac event including death.

Results:-

Revascularization and Inhospital major cardiac events

- Complete Revascularization in 93 pts, 81%.

Percutaneous Coronary Intervention had achieved elimination of all stenotic lesions.

In this group; five pts had Inhospital Major Cardiac Events with significant enzyme leak and ST-T changes suggestive of NSTEMI, 5.4%:-

Incomplete Revascularization in 20 pts

In this group the procedure had dealt with two categories of pts:-

Category one: - Patients who had dilatation of the culprit lesion /s only leaving another lesion/s for to be dealt with later, 15 pts.

Category two: - Those pts who had dilatation of all lesions except one lesion which was left due to technical difficulty that led to failure of crossing of the lesion by the wire or the smallest balloon, 5 pts.

Major Cardiac Events had occurred in five pts also, two pts had Recurrent angina and three had NSTEMI. Four of those events occurred in the fifteen pts in category one i.e. pts with Incomplete revascularization due to dilatation of the Culprit-lesion-only, 26.7%.

Failed Revascularization in two pt 2%.

The two patients got no benefits because of failure to pass even the smallest balloon despite pains taking attempts. Both patients were originally referred for targeted PCI in our Catheter Laboratory as they previously had multiple PCIs, in addition that one of them had had CABG as well. One pt. suffered Acute Closure with M.I, the other one had acute coronary rupture which was promptly sealed by graft stent however he developed NST-MI 72 hrs later. Restenting did not help because of poor distal flow that he went into cardiogenic shock and died (1%). See table 1

Table -1- shows that 5% pts with complete revascularization had Inhospital Major Cardiac Events, compared to 27% pts with incomplete revascularization where culprit-lesion-only revascularization was adopted.

Table -1- Revascularization and major inhospital cardiac events

Event/ Revascularization	Complete Revascularization 93 pts	Incomplete Revascularization due to culprit-Lesion-only Revascularization 15 pts	P.V
Major Cardiac Events	5 5.4%	4 26.7%	0.02

Revascularization and the number of risk factors
The likelihood of achieving Complete revascularization was strikingly linked to the number of the traditional risk factors Table -2- shows that the rate of complete Revascularization was inversely related to the no. of risk factors as it had dropped from 100% in pts with no Risk Factor to 85% in pts with one Risk Factor, 79% in pts with two Risk Factors and to 67% in pts with 3-5 Risk Factors.

Table -2- Relation of the rate of complete Revascularization to the number of Risk Factors.

R.F no. / Revasc.	complete Revascularization	P.V
	93 pts 81%	
Nil 12	12 100%	
1 RF 40 pts	34 85%	
2 RF 39 pts	31 79%	
3-5 RF 24 pts	16 67%	0.001

Stenting (no. of stents) and the no. of risk factors. Ninety five pts had required Coronary Artery Stent Deployment (83%), while the remaining twenty pts had Angioplasty alone (17%). The data showed that the vast majority of pts without major Risk Factor required no more than a single stent (78%) compared to 23% of pts with 3-5 risk factor

Data illustrates that increasing the no. of risk factors was associated with the steady increase of the no. of patients who required two stents and also those who needed three stents. This increase is more remarkable if the two groups were put together (as multiple stents) i.e. from 22% in pts without Risk factor, to 36% in pts with one risk Factor, to 45% in pts with two Risk Factors, and to 72% in pts with 3-5 Risk Factors. See table -3-

Table -3- Relation of the no. of Stents to the no. of Risk Factors

R.F / Stents	Single Stent +-PTCA 50 pts	Two stents +- PTCA 25 pts	Three or more stents +- PTCA 19 pts	Multiple Stents ie two or more
Nil R,F 9 pts	7 78%	1 11%	1 11%	2 22%
1 R.F 33 pts	21 64%	8 24%	4 12%	12 36%
2 R.F 31 pts	17 55%	8 26%	6 19%	14 45%
3-5 R.F 22 pts	5 23%	8 36%	9 41%	17 72% P= 0.02

Discussion

Percutaneous Coronary Intervention had become an effective mean of revascularization of pts with Ischaemic heart disease and in particular those with chronic stable angina and more recently those with Acute Myocardial infarction (4-7). As far as its role in Revascularization of patients with Non-ST—

Elevation Acute coronary syndrome, the first Randomized Trials had either failed to show benefit (the TIMI IIB Trial) or suggested that this could be harmful (the VANQUISH Trial). However the high crossover from the conservative arm of both trials to the early invasive arm meant that their findings ought to be interpreted with caution (8,9). Subsequently, with the advent of stenting, clopidogrel and Glycoproteins 11b 111a receptors blockers the interventional approach gained great ground especially so following the publication of three meta-analysis culminated by a review article by Robert P. Giugliano and Eugene Braunwalds in 2005 (10-15)

In our study PCI had secured complete revascularization in 81% of the pts with Non ST-Elevation Acute Coronary syndrome. William DO etal from Rhodes Island hospital reported results of Angioplasty in Acute coronary syndrome in the TIMI I11B Trial that showed a high success rate of 96%(8) Keelan etal from the Mayo clinic Rochester had reported the success rate 87.9% in women and 87.2% in men in more than three thousands pts with Unstable Angina (16). It is obvious that definition of successful Revascularization is not clear cut which may affect the figures. In our study complete revascularization meant eliminating all significant lesions.

A report by Mehta etal who analyzed the data of seven trials Comparing routine Invasive approach to selective invasive approach has found the routine invasive approach was associated with hospital mortality of 1.8%.(13), In our centre we followed the routine invasive approach that had yielded a low mortality of 0.9%. Our morbidity was a little high at 11% where we included all patients with enzyme leak despite having though most had no evidence of deterioration of left ventricular function.

In our study Complete revascularization was associated with inhospital Major Cardiac Events of 5% compared to 27% in those who underwent Culprit lesion angioplasty and stenting only suggesting that leaving significant lesions behind might not be wise, however Giuseppe Mariani et al who studied patient with unstable angina only had reported no real difference between those who had complete and those who had incomplete revascularization, (10% versus 7.5%) (17).

In this work we had explored the link between the number of the traditional risk factors and the probability of achieving complete revascularization and found that all patients without any risk factor had complete revascularization. This probability had dropped as the number of risk factors increased probably reflecting a direct relationship of the number of risk factor and severity of the underlying coronary artery disease. This message was reinforced further if we looked at the number of the deployed stents

Conclusion:-

This study had shown that Early PCI had succeeded in revascularization of 98% of patients with NSTEMI-ACS. Revascularization was complete in 81% of the pts. Patients with Complete revascularization had much lower In-hospital cardiac events than patients who had culprit-lesion-only revascularization. This may suggest that leaving significant lesion/s behind might not be the best option. Only 2% of patients did not benefit from early PCI because they had a very advanced disease with repeated PCI/CABG, which speaks of the need of proper selection of pts. The likelihood of complete revascularization was inversely related to the no. of Risk factors. On the other hand the no. of stents deployed had proportionately increased with the no. of risk factors. This may reflect a direct relationship between the number of risk factors and the severity of the underlying coronary disease.

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