Routine Early Coronary Angioplasty versus Ischaemia-Guided Coronary Angioplasty after Successful Thrombolysis in Patients with Acute Anterior STEMI

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ABSTRACT

Background: the potential benefits of routine early intervention after thrombolysis include prevention of re-infarction, recurrent ischemia, and reduction of the infarct size and mortality.

Aim of the work: the purpose of this study is to compare routine early coronary angioplasty in patients with acute anterior STEMI after successful thrombolysis versus ischaemia-guided coronary angioplastyas regards the occurrence of MACCE.

Study design: a total number of 100 patients with acute anterior STEMI received thrombolytic therapy and then were randomly assigned to either routine invasive strategy or ischemia based strategy based on risk stratification by stress myocardial perfusion scan done within 30 days of the onset of AMI with subsequent CA after demonstration of residual myocardial ischemia and or good viability.

Results: the cumulative incidence of MACCE including recurrent ischemia, stroke, MI, HF or mortality was significantly lower in theroutine early invasive strategy.

Conclusion: STEMI patients who cannot undergo timely primary PCI should receive prompt fibrinolysis followed by early routine invasive strategy.

Keywords: Pharmaco-invasive *PCI*.

INTRODUCTION

Mechanical recanalization by primary *PCI* is an extremely effective reperfusion treatment for *STEMI* and has been demonstrated to be superior to fibrinolytic therapy in reducing mortality when it can be performed rapidly.[(1)]

However, many hospitals lack *PCI* facilities and few provide around-the-clock staffing for these procedures. Since reperfusion is a key strategy to decrease mortality and major cardiovascular events in *STEMI* care, and the benefit is time-dependent; therefore thrombolytic therapy is administered to eligible patients if primary *PCI* cannot be performed in a timely fashion.[(2)] Current guidelines recommend an early routine coronary angiogram *3-24* hours after successful thrombolysis.[(3)]

SUBJECTS AND METHODS

This study enrolled *100* patients presented with acute anterior *STEMI* and received thrombolytic therapy. Patients were randomly assigned to either routine invasive strategy (Group *A*): scheduled for *CA* within *24* hours after successful thrombolysis or **i**schemia based strategy (Group *B*): scheduled for risk stratification based on stress myocardial perfusion scan done within *30* days of the onset of *AMI* with subsequent *CA* and intended revascularization after demonstration of residual myocardial ischemia and or good viability. Patients with poor myocardial viability (*<50%* radiotracer uptake in *>40%* of vessel territory) continued on their optimal medical treatment.[(4)] Patients with recurrent ischemiaor who developed hemodynamic instability during hospital stay underwent urgent intervention. Follow up for *3* months from the onset of *AMI* implied special emphasis on occurrence of *MACCE* and echocardiographic examination repeated after *3* months of the onset of *AMI*.

STATISTICAL ANALYSIS: Data were analyzed using *IBM© SPSS©* Statistics version *22* (*IBM©* Corp., Armonk, *NY, USA*) and *MedCalc©* version *14* (MedCalc© Software bvba, Ostend, Belgium). Continuous numerical data were presented as mean ± standard deviation (*SD*). Categorical Data were presented as ratio or as number (*%*) and between-group differences were compared using the chi-squared test or Fisher's exact test, when appropriate. To detect the risk relative risk (RR) was used. A two-sided *p*-value *<0.05* was considered statistically significant.

RESULTS

***CA* and mechanical revascularization:** In group A, patients underwent pharmaco-invasive *PCI* of the *IRA (LAD)*. Patients in group *B* were assigned to ischemia based strategy (spontaneous or induced ischaemia), *34* patients underwent stress gated *SPECT* study done within one month of the

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onset of *AMI*. *16* patients of group *B* needed urgent intervention of the culprit vessel. *TIMI* flow grade before and after *PCI* was significantly better in group *B.*

In-hospital outcome for both study groups: Patients in group *A* showed highly statistically significant lower rates of recurrent chest pain *(2% versus 18%, P<0.01)* and need for urgent (re)intervention *(2% versus 26%, P<0.01)*, also the length of hospital stay was significantly shorter in group *A* with a median of *3* days in group *A* and ranged from *3-5* days in group *B (P<0.01*).

DISCUSSION

The concept of initiating lytic therapy immediately in patients who cannot undergo primary *PCI* for a variety of reasons (lack of facility, lack of personnel, busy cath lab, *etc*) while they wait for intervention is appealing and seems to make sense. Early referral for angiography after successful thrombolytic therapy has been associated with reduced rate of adverse cardiac events in many recent trials and seems to be superior to the classic approach of ischemia-guided invasive strategy.[5]

Cantor WJ and his colleagues reported the results from the *TRANSFER-AMI* clinical trial in which more than *1000* Canadian patients with *STEMI* were treated with fibrinolysis and were randomly assigned to routine early *PCI* within *6* hours after fibrinolysis or an ischemia guided strategy. The rate of recurrent ischemia was significantly reduced with early routine *PCI* which agrees with the results of the current study.[6]

In our study, early revascularization strategy within *24* hours after successful thrombolysis showed better outcome. Also the time from onset of symptoms to administration of thrombolytic therapy was the only independent predictor for *MACCE* at *3*-months, and thisevokes the famous revolutionary hypothesis *"Time is muscle"* that had been postulated few decades ago and highlights the importance of time to reperfusion for *STEMI* patients whether a pharmacologic or a catheter-based strategy is used, The sooner we get the infarct artery open, the better the patient will do because myocardium will be salvaged.

9.

Most recently, the *STREAM* trial randomized *1892* patients with symptoms of *<3* hours to early fibrinolysis with *TNK* followed by early *(6-24 hours)* angiography and *PCI* versus primary *PCI*. The primary composite end point of death, cardiogenic shock, heart failure or reintervention by *30* days was similar, emphasizing the value of very early fibrinolytic therapy, particularly when primary *PCI* will be relatively delayed.[7] It could be argued that a reduction in the rate of recurrent ischemia alone does not necessarily justify the strategy of routine early *PCI* after successful fibrinolysis, since presumably a patient can be transferred for elective or urgent PCI if ischemia recurs. However; a meta-analysis of contemporary trials has shown that there are significantly lower mortality and reinfarction rates with routine early *PCI* after fibrinolysis than with a more conservative ischemia-guided approach.[8]

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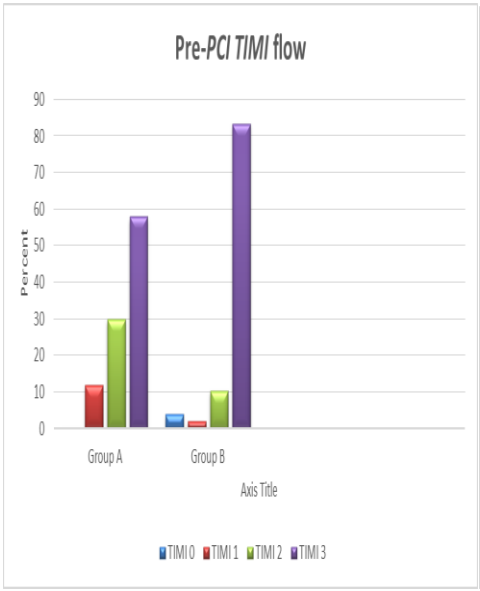

Figure (1): Pre-PCI TIMI flow

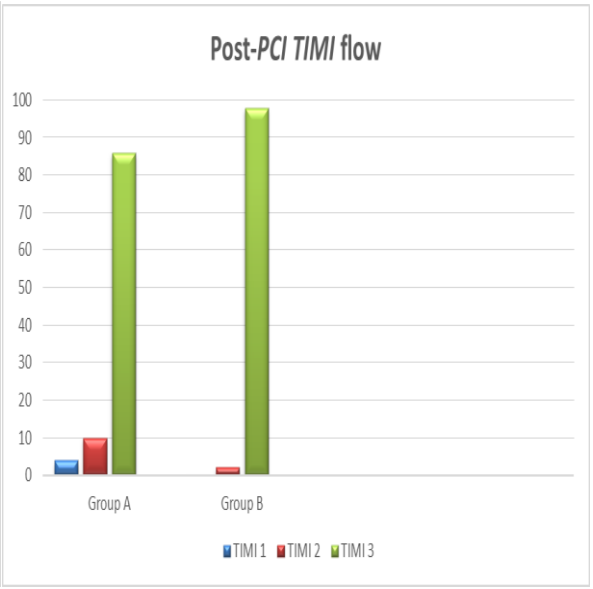

Figure (2): Post-PCI TIMI flow

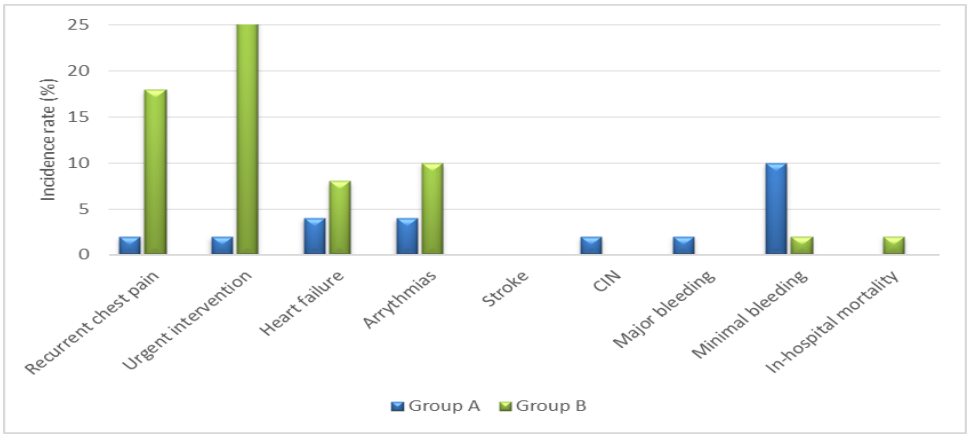

Figure (3): In-hospital outcome measures in both study groups.

Table (1): Relevant findings in the radioisotope scan in group B

Variable	Group *B* (n=34)
Radioisotope scan	
Peri-infarct ischemia	31 (91.2%)
Viability	32 (94.0%)
Scar	28 (82.4%)
Ischemia territory	
LAD	34 (100.0%)
LCX	4 (11.8%)
RCA	5 (14.7%)

Data are presented as number (valid *%*) or mean (*SD*) *LAD*: left anterior descending, *LCx*: left circumflex, *RCA*: right coronary artery, MI: myocardial infarction and *n*: number.

Table (2): Outcome measures at 3-months in both study groups

Variable	Group *A* (n=50	Group *B* (n=4	*p*-value
Recurrent chest pain within 3 months	0 (0%)	3 (6.2%)	0.114 (NS)
Urgent intervention within 3 months	0 (0%)	3 (6.2%)	0.114 (NS)
Heart failure within 3 months	2 (4.0%)	2 (4.2%)	1.000 (NS)
Arrhythmia within 3 months	0 (0%)	0 (0%)	-
Stroke within 3 months	0 (0%)	0 (0%)	-
Three-months mortality	0 (0%)	1(2.04%)	0.495(NS)
Readmission within 3 months	1 (2.0%)	3 (6.2%)	0.357 (NS)

Data are presented as number (%).Fisher's exact test. n= Number of patients in the group. P= Probability of chance (Significance).NS= Non-significant.

Table (3): Incidence of MACCE during hospitalization and at 3-months *and the cumulative incidence of MACCE* in both study groups

Variable	Group *A* (n=50)	Group *B* (n=50)	p-value
MACCE during hospitalization	3/50 (6.0%)	13/50 (26.0%)	**0.006** (HS)
MACCE at 3-months	2/50 (4.0%)	6/49 (12.2%)	0.160 (NS)
Cumulative incidence of *MACCE* by end of follow-up	3/50 (6%)	17/50 (34%)	<**0.001**(HS)

Data are presented as ratio (valid %). ¶ Fisher's exact test. n= Number of patients in the group. P= Probability of chance (Significance).NS= Non-significant. HS=Highly significant.

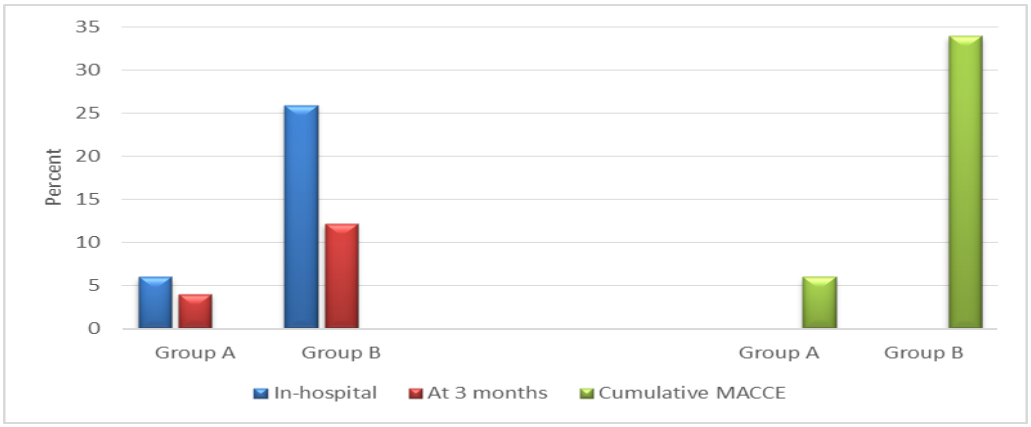

Figure (4): Incidence of MACCE during hospitalization and at 3-months and the cumulative incidence of MACCE in both study groups.

Table (4): Risk analysis for the occurrence of MACCE during hospitalization and at 3-months *and the cumulative incidence of MACCE*

Index	*MACCE* during hospitalization	*MACCE* at 3-months	Cumulative incidence of *MACCE*
Relative risk (RR)*	4.33	3.1	5.67
95% CI for RR	1.31 to 14.28	0.65 to 14.43	1.77 to 18.13
z statistic	2.410	1.414	2.923
p-value	**0.016** (S)	0.157 (NS)	**0.004** (HS)
Number needed to harm (NNH)	5.0 (Harm)	12.13 (Harm)	3.57
95% CI for NNH	16.20 (Harm) to 2.96 (Harm)	5.30 (Harm) to 42.20 (Benefit)	2.34 to 7.51

*Ischemia-based strategy is referenced to routine early revascularization strategy. Z-test. P= Probability of chance (Significance). NS= Non-significant. HS= highly significant.