Incidence of Early Left Ventricular Thrombus and Stroke After Acute Myocardial Infarction in the Primary Coronary Intervention Era Compared to Conservative Treatment

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SUMMARY
Background: Left ventricular thrombus is a well known complication of acute myocardial infarction (AMI). There are different data according to incidence of left ventricular thrombus in relation to the treatment of acute myocardial infarction. Objectives: The aim of this study was to further clarify the advantages of one or the other method related to complications after acute myocardial infarction. Methods: This study was approved by the Committee of Ethics. Written informed consent was obtained from the patients prior to enrolment. This was a prospective study performed in two different cardiology centers in the same city, with different possibilities to treat acute myocardial infarction; one conservatively and another invasively. Four hundred consecutive patients with ST elevation acute myocardial infarction were accepted in the study during 2010. (200 patients per each center) respectively. Structural index, mean average, standard deviation, t-test and Chi² were derived by SigmaStat and SPSS program. Results: No significant demographic data differences were found between two groups. Incidence of LVT were in PCI group 2% and 25% in non-PCI group, with significant difference (p≤0.0003). No patients with ischemic stroke were recorded in PCI group and 4% were found with strokes in non-PCI group or 16% in those with left ventricular thrombus of non-PCI group. Conclusions: PCI treatment is highly effective in reducing left ventricular thrombus compared to non-PCI treatment. Our data are in favor of aggressive treatment of acute myocardial infarction, resulting in fewer left ventricular thrombus and strokes. Key words: left ventricular thrombus, myocardial infarction, stroke.

1. INTRODUCTION

Left ventricular thrombus (LVT) is a well recognized complication of acute myocardial infarction (AMI). The incidence of LVT for patients treated conservatively has been reported to be 20-57%. In myocardial infarction survivors the incidence of LVT depends on location, magnitude, time of hospital admission, thrombolytic therapy, ejection fraction. It occurs mostly in those with large anterior Q-wave infarctions, particularly in the presence of a left ventricular aneurysm (1, 2, 3).

The incidence of LVT after primary percutaneous coronary intervention (PPCI) for AMI has been reported to be from 4% to 12%. The most important parameter confirmed to be time of revascularization (4, 5). The clinical significance of LV thrombi lies on their potential risk of systemic embolization. The incidence of stroke in the acute phase following MI is approximately 5.4% and up to 91% reported in patients with documented left ventricular thrombus (6, 7).

The long-term risk of stroke following MI is about 6%. Strokes are mainly ischemic. Risk factors include advancing age, diabetes mellitus, previous history of stroke, history of hypertension, and smoking (8).

Left ventricular thrombus complicating (AMI) results from turbulent blood flow and stasis related to an akinetic left ventricular wall segment or aneurysm. Predictors of left ventricular thrombus were low ejection fraction and severe mitral regurgitation. Possible causes of LVT include segmental dysfunction of the infarcted myocardium causing stasis, endocardial tissue inflammation providing a thrombogenic surface. There is evidence that LVT usually develop within a few days after AMI (9, 10). Catheter-based reperfusion therapy is superior to thrombolysis in promoting early myocardial recovery, with improved clinical outcomes (11). A recent meta-analysis suggests that angioplasty provides a short-term clinical advantage over thrombolysis (12).

Two-dimensional echocardiography is an established exam and technique of choice for assessing LVT presence, shape, and size, and recent technical advances in echocardiographic methodology, such as high-frequency, short-focal-length transducers, have improved the echocardiographic evaluation of LVT. The transducer is placed over the left ventricle to visualize the apical 4-chamber view. The apical long-axis view is used to examine the midventricular and papillary muscle levels. The LV is scanned in a transverse orientation to detect the presence of a thrombus. Thrombi are typically visualized as echolucent masses that move with the cardiac cycle. Two-dimensional and Doppler echocardiography can also be used to assess LV function and to determine the presence of mitral regurgitation, which is a risk factor for LVT.
diographic assessment of LV mural thrombus (13).

2. METHODS

This study was approved by the Committee of Ethics. Written informed consent was obtained from the patients prior to enrolment. This is prospective study performed in two different cardiologic centers, with different possibilities to treat acute myocardial infarction; one conservatively and another invasively. Four hundred consecutive patients with ST elevation acute myocardial infarction (STEMI) were enrolled in the study. Baseline demographic characteristics, type of treatment, and other therapies instituted were recorded. Two-dimensional echocardiography was performed using a Vivid-55 ultrasound machine (GE Medical Systems) and iE33 Philips ultrasound. within two days of infarction. Two level echocardiographers blinded to the clinical details separately reviewed the echo images in each patient. LV thrombus was defined as an echodense mass with definite margins, contiguous but distinct from the endocardium, adjacent to an area of hypo- or akinetic myocardium.

Two-hundred patients were treated with conservative treatment, non-PCI group and 200 with primary percutaneous coronary intervention, PCI group. PCI was successful in all patients. The time delay from symptom onset to intervention was 180 minutes. Thrombolysis in Myocardial Infarction (TIMI) grade 3 flow was achieved in 95% of cases. Structural index, mean average, standard deviation, t-test and Chi2 were derived by SigmaStat and SPSS program.

3. RESULTS

Four-hundred patients were enrolled in the study. First group, 200 patients treated with PCI in early hours of AMI (within 3 hours), second group (200 patients) received conservative treatment either with or without thrombolytic. Mean age of the first group was 58.95 years and 57.58 years for the second group.

There were no significant baseline demographic data differences. Significant differences between groups can be seen with treatment with Low Molecular Weight Heparin (LMWH) and streptokinase (STK) (due to current protocols for treatment of AMI (Table 1).

Stents were deployed in all (200) patients of PCI-group. TIMI III flow in the infarct related vessel was achieved in 190 patients, whereas TIMI II was achieved in 10 patients. Four patient in PCI group had LV thrombus, 2% of the total (4/200) (Table 2) or 5.6% (4/71) of them with anterior MI (Table 3).

In non-PCI group 50 patients had LVT, 25% of the total (50/200) (Table 2). In the anterior subgroup thrombus was present in 94% (47/50) of cases (Table 4). Only in 6% (3/50) of cases the thrombus was detected in inferior MI (Table 4).

Comparison of incidence of LVT of two different treatment (PCI vs. non-PCI) resulted to be with high significant difference (p≤0.0003)

<table>
<thead>
<tr>
<th>Table 2. Presence of Thrombus</th>
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<tr>
<td>PCI n=200 %</td>
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<tr>
<td>Yes</td>
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<tr>
<td>No</td>
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<th>Table 4. Left ventricular thrombus-LVT and infarcted wall in non-percutaneous coronary intervention (PCI) group *Acute Myocardial Infarction</th>
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<tr>
<td>PCI Pt=200</td>
</tr>
<tr>
<td>LVT</td>
</tr>
<tr>
<td>no stroke</td>
</tr>
<tr>
<td>stroke ischemic</td>
</tr>
<tr>
<td>hemorrhagic</td>
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<td>Total</td>
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Table 5. Incidence of strokes in percutaneous coronary intervention (PCI) and in non-PCI group.
Differences exist, as depicted in Table 1, in medical treatment according to current protocols. We found out that PCI is superior to non-PCI in the incidence of LVT (2% vs. 25% p<0.0003). The incidence of strokes in the acute phase following MI is approximately 5.4% and up to 9% reported in patients with documented left ventricular thrombus (7).

Sixteen percent of patients with LVT in non-PCI group had strokes, and just 0.66% in patients of non-PCI group without LVT. No patients of PCI group had ischemic stroke and one had hemorrhagic stroke.

5. CONCLUSION

PCI treatment is highly effective in reducing LVT and strokes compared to non-PCI treatment. Further studies are needed to elucidate treatment protocols for non-PCI treatment of anterior AMI, in order to reduce the LVT incidence when PCI is not possible to be performed.

REFERENCES