INTRODUCTION

Primary percutaneous coronary intervention (pPCI) is, currently, the treatment we choose for patients with ST segment elevation myocardial infarction (STEMI). The thrombolytic treatment is an appreciated alternative when the reperfusion therapy is not available in due time. In chronic coronary artery disease, in contrast to acute coronary syndromes, clinical trials have not shown percutaneous coronary intervention (PCI) to reduce cardiovascular events [1–6]. COURAGE (Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluations), a randomized trial comparing PCI plus optimal medical therapy (PCI group) with optimal medical therapy alone (medical therapy group), demonstrated no difference in the primary end point of death or myocardial infarction [7]. PCI had an advantage, however, in angina control. The COURAGE trial did not find the addition of PCI to medical therapy to be a cost-effective initial management strategy for symptomatic, chronic coronary artery disease. The cost for 1 patient to have clinically significant improvement in angina for between 6 and 36 months [8] exceeds $100 000. The economic outcomes in COURAGE are consistent with the clinical outcomes, which show that it is safe to defer PCI. The present analysis suggests that such an initial management strategy will achieve appreciable savings in health expenditures [9].

AIM

Our study aims to assess both the costs and the benefits of the patients with IMA with ST segment elevation treated with Primary coronary intervention (PCI) associated with medical therapy vs. Thrombolytic therapy vs. Conventional therapy.

METHODS:

625 patients with acute ST–elevation myocardial infarction admitted in our clinic from January 2010 until May 2011 were analyzed. Inclusion criteria were represented by:

- acute ST-elevation myocardial infarction within 12 hours from onset of symptoms on admission.

The diagnosis was set on the following criteria:

1. Clinical criteria: deep, prolonged pain (more than 15–20 minutes) retrosternal or epigastric located, with or without radiation to the shoulder and / or left upper limb and / or neck and / or interscapulovertebral left and does not respond to administration of nitroglycerin;
2. Electrocardiographic criteria: ST segment elevation ≥ 0.2 mV in V2-V3 and / or ≥ 0.1 mV in other derivatives or new onset left bundle branch block;
3. Biological criteria: pathological growth of myocardial necrosis revealing enzymes (CK / CK-MB); fields on the levels of troponin10 have been subsequently entered into the database.

The patients have been analyzed on discharge from hospitalization following acute ST-myocardial when treatment management was taken into account as well as left ventricle ejection fraction (EF %). The average duration of hospital stay in intensive care coronary unit was determined.

Out of the 625 patients in our study, only 81 received primary PCI therapy, 232 patients received thrombolytic therapy and 298 patients received conventional therapy.
The direct medical costs, represented by: the average cost of hospital days, costs of medicines and sanitary materials, cost of procedures and laboratory investigations were included in the costs calculation.

Nonmedical costs considered to be both the social ones arising from the patient disability to provide an activity that generates him/her an income and those derived from his/her home care need were not included.

The used drug costs were those of the 2011 Canamed to which were added the average costs of hospitalization per day, the medical costs and materials costs as well as the costs for paraclinical investigations and procedures which are those accounting services provided by the Institute of Cardiovascular Diseases Timisoara.

As for the benefits of these therapies, they have been assessed by the rate of major complications that have occurred according to the treatment received: stroke, major bleeding, angor post myocardial infarction, reinfarction.

RESULTS:

The method of treatment chosen by doctors for a particular patient (thrombolysis, primary angioplasty or conventional treatment) is shown in Figure 1.

Almost half of the 625 patients were treated with a conventional therapy, 37.07% received thrombolytics, and 12.93% were treated by primary angioplasty. In 19 patients (9.44%) the type of therapy was not mentioned. Among patients who received thrombolytic therapy, 172 received it in pre-hospital (74.13%) (Fig. 2).

Conventionally treated patients had a significantly higher average age, were represented, in a significantly higher proportion, by women, were significantly more often infraction in Killip classes III or IV and had an elapsed time from the onset of stroke to admission significantly higher compared with those treated with thrombolytic or primary angioplasty (p <0.0001 for all comparisons). Thus, older age, more severe Killip class, longer 'stroke onset-admission" and females appear to be factors that reduced the chance of those patients to be treated by means of reperfusion.

While the incidence of hypertension was almost similar in the three groups of patients, the number of smokers and those with dyslipidemia was lower among patients with conventional therapy (p <0.0001). Notice that the percentage of smokers and of dyslipidaemic patients was significantly higher in the group treated with primary angioplasty compared with those treated with thrombolytics.

81 of the 625 patients hospitalized with acute myocardial infarction with ST segment elevation were treated with PCI within the first 6 hours plus specific drug therapy. The duration of hospitalization of these patients did not exceed 72 hours.

The costs of this therapeutical approach were represented by:

- The average cost per day of hospitalization which is of 335 RON plus conventional medical therapy in the amount of 487 RON and nonspecific sanitary materials of 595 RON. Nonspecific paraclinical investigations are of 251 RON and are the same for all three therapeutic approaches.

The 232 patients treated with thrombolytic agents have an average duration of hospitalization of 5 days. The costs of this treatment method are:
Post-infarction angina was significantly more common in patients with thrombolytic therapy (30.46%) compared with those treated conventionally (21.19%, \( p < 0.0001 \)) and with those with interventional treatment (7.28%, \( p < 0.0001 \)). The difference between patients who received conventional and interventional treatment was also significant (\( p < 0.0001 \)). Reinfarction rate was similar in patients with thrombolytic therapy (27.82%) compared with patients treated by primary angioplasty (31.3%, \( p < 0.613 \)), but both values were significantly higher compared with the rate of reinfarction occurred in patients treated conventionally (7.82%, \( p < 0.0001 \)).

Overall hospital mortality was 15.31% in patients treated conventionally, significantly higher than the value of 9.16% recorded in patients with thrombolytic therapy and less than the 6.62% recorded in interventional patients (\( p < 0.0001 \) for both comparisons) – Figure 3.

**CONCLUSIONS:**

Therapy costs of the acute myocardial infarction with ST segment elevation are different in the three therapeutic approaches, as of 4238 RON for primary PCI, 5338 RON for thrombolytic therapy and 2652 RON for conventional therapy; that means the primary PCI costs 1.6 times more than the conventional therapy, respectively 0.8 times more than the thrombolytic therapy.

As for the benefits of the three therapeutic approaches quantified by the rate of major complications we noticed that:

<table>
<thead>
<tr>
<th>MAJOR COMPLICATION post-infarction</th>
<th>CONVENTIONAL treatment</th>
<th>TROMBOLYTICS</th>
<th>Primary ANGIOPLASTY</th>
<th>Other TYPE /unknown</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nr.</td>
<td>%</td>
<td>Nr.</td>
<td>%</td>
<td>Nr.</td>
</tr>
<tr>
<td>Strokes (CVA)</td>
<td>18</td>
<td>26.47</td>
<td>16</td>
<td>23.52</td>
<td>12</td>
</tr>
<tr>
<td>Major bleeding</td>
<td>8</td>
<td>14.03</td>
<td>21</td>
<td>36.84</td>
<td>11</td>
</tr>
<tr>
<td>Post-infarction angina</td>
<td>32</td>
<td>21.19</td>
<td>46</td>
<td>30.46</td>
<td>11</td>
</tr>
<tr>
<td>Reinfarction</td>
<td>9</td>
<td>7.2</td>
<td>32</td>
<td>27.82</td>
<td>36</td>
</tr>
</tbody>
</table>

Table 1. Costs of the three therapeutic approaches used for patients with STEMI

<table>
<thead>
<tr>
<th>Costs categories</th>
<th>PCI</th>
<th>Thrombolytic therapy</th>
<th>Conventional therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalization episode cost</td>
<td>1005</td>
<td>785</td>
<td>1099</td>
</tr>
<tr>
<td>Drugs</td>
<td>487</td>
<td>487</td>
<td>487</td>
</tr>
<tr>
<td>Paraclinical investigations</td>
<td>251</td>
<td>251</td>
<td>251</td>
</tr>
<tr>
<td>Specific sanitary materials</td>
<td>1900</td>
<td>3000</td>
<td>0</td>
</tr>
<tr>
<td>Nonspecific sanitary materials</td>
<td>595</td>
<td>815</td>
<td>815</td>
</tr>
<tr>
<td>Total</td>
<td>4238</td>
<td>5338</td>
<td>2652</td>
</tr>
</tbody>
</table>

Table 2. The incidence of strokes (CVA), major bleeding, post-infarction angina and reinfarction in STEMI patients treated conventionally with thrombolitics or primary angioplasty.
• The highest incidence of major bleeding occurs with thrombolytic treatment and the lowest occurs in conventional treatment.

• Postinfarction angina is significantly more frequent in thrombolytic and interventional therapy and is lower in interventional therapy.

• Reinfarction rate is higher for thrombolytic and interventional therapy and it is more reduced in conventional therapy.

References:


8. ANTITHROMBOTIC TRIALIST COLLABORATION.; Collaborative metaanalysis of randomised trials of antiplatelet therapy for prevention of death, myocardial infarction, and stroke in high risk patients.; BMJ 2002; 324: 71-86.
