DIRECT CORONARY STENTING WITHOUT PREDILATATION IN SELECTED PATIENTS WITH SIGNIFICANT CORONARY ARTERY DISEASE

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Background: Direct coronary stenting is the primary therapeutic option for the treatment of many coronary lesions. Depending on the operator’s experience, it can result in a good outcome and low restenosis rates.

Objective: To assess the outcome of direct coronary stenting in patients who underwent this procedure.

Methods: Two hundred and ten (164 males and 46 females) patients from April 2000 through April 2002, who had significant (> 70%) coronary artery stenosis were included in this study. Patients were recruited from Mehrad, Day, and Pars Hospitals. Direct coronary stenting was performed on unioperator procedure for 162 (77.1%) patients in one location, 43 (20.5%) in two locations, and 5 (2.4%) patients in three locations. Age, sex, involved vessel, failure rate, possible complications, and restenosis rate were assessed.

Results: The mean ± SD age of participants was 55.62 ± 10.08 years. The target vessels of those 266 lesions were left anterior descending (LAD) (70.4%), circumflex (CX) (11.7%), right coronary artery (RCA) (8.9%), obtus marginatum (OM) (3.2%), ramus (2.3%), posterior descending artery (PDA) (1.7%), and saphenous vein graft (SVG) on OM (1.7%). Lesion types were graded as A (50%), B1 (20%), B2 (20%), and C (10%). Stents were successfully deployed in 99% of patients and were 2.5 – 3.5 mm in diameter and 8 – 23 mm in length. AVE (32.7%), Nexus (26.7%), Bio (18.8%), Multi-Link (16.1%), Cordis (2.6%), Jomed (1.8%), and others (1.3%) were the stents applied in the lesions of these patients. There were no mortality nor any major in-hospital complications. Seventy percent of patients were closely followed up for at least 6 months. Exercise stress, thallium, and/or angiography tests were performed when indicated. The stent restenosis rate was 1% in short-term (one month) and 14% in long-term (six months) follow-up.

Conclusion: Good short- and long-term results of stent implantation without predilatation will be obtained in carefully selected patients. This technique can be used in the high grades (B2, C) of lesions safely and effectively. Furthermore, direct stenting can reduce the radiation exposure, costs of hospitalization, and the operation time.

Introduction

Percutaneous transluminal intervention (PCI) technique has been used extensively in various coronary lesions.1, 2 Recent studies have demonstrated the favorable results of stent implantation in the stenosed coronary artery lesions. The purpose of placing a stent in a coronary artery is to improve the patency in treated vessels. Direct coronary stenting is a new method in which stent implantation is carried out without predilatation by balloon. Direct coronary stenting without balloon predilatation has the potential benefits of a reduced risk of extended dissections, fluoroscopy exposure, procedural time, and cost savings. This method is now the primary therapeutic option for the treatment of many coronary lesions.3 – 5 Good
planning and careful equipment selection play a major role in the outcome of the procedure. The primary determinant of successful stent implantation depends on the characteristics of the stent, lesion-specific variables, and the operator’s experience.\textsuperscript{6 – 9} In this study, we assessed a unioperator direct stenting procedure in patients suffering from coronary artery disease.

**Patients and Methods**

Based on a unioperator procedure in three hospitals—Mehrad, Day, and Pars Hospitals—a cross-sectional study was performed between April 2000 and April 2002. The medical records of 210 patients who had undergone direct coronary stenting were reviewed. All patients had significant coronary stenosis (> 70% of vessel lumen in proximal, middle, and/or distal portion of each artery). Direct coronary stenting was performed for 162 patients in one location, 43 in two, and five patients in three locations. The total number of lesions in these 210 patients were 266 target vessels (Table 1).

The lesions were graded as standard A, B\textsubscript{1}, B\textsubscript{2}, and C. One hundred and thirty-three lesions had grade A, 53 had grade B\textsubscript{1}, 54 grade B\textsubscript{2}, and 26 had grade C. Other variables including age, gender, stent brand, failure rate, complications, and restenosis rate were assessed as well.\textsuperscript{10}

**Results**

Of the 210 patients, 164 were men and 46 were women. The mean $\pm$ SD age of participants was 55.6 $\pm$ 10.1 years. There were two (1%) out of 210 patients who had immediate failure and were referred for coronary artery bypass graft surgery (CABG) secondary to heavily calcified lesions, diagnosed for three months or more. In the rest of patients, all stents were deployed successfully in all of the 266 target vessels. The follow-up program consisted of a complete history and physical examination to rule out the restenosis. According to their complaints, patients were then referred for an exercise tolerance test, thallium scan, and/or coronary angiography. Based on the above-mentioned tests, 29 (14%) patients had restenosed vessels.

**Discussion**

As our study revealed, good short- and long-term results of stent implantation without predilatation can be obtained in carefully selected patients, and it can be used in lesions with high grades (B\textsubscript{2}, C) safely and effectively. Stys et al\textsuperscript{10} in their study with 128 sequential patients eligible for direct stenting revealed that, direct stenting was successful in 99% of patients without major procedural complications. At six months, no statistically significant differences were observed in overall major adverse cardiovascular events. So the authors concluded that, direct stenting has a high success rate, low complication rate, and durable long-term results. Moreover, procedural cost and time savings, less contrast use, and radiation exposure make direct stenting feasible in appropriately selected patients.

Miketic et al\textsuperscript{4} in a randomized clinical trial on 181 patients undergoing coronary intervention for symptomatic coronary artery disease randomized them to either conventional angioplasty with optional stenting or to direct stent implantation without predilatation. Follow-up angiography was performed six months later. In the group who had undergone direct stenting, the procedural success was 94.6% with 2 patients experiencing a Q-wave myocardial infarction without further complications. They concluded that direct stenting significantly reduces the overall procedure and fluoroscopy times, the amount of contrast medium used, and the number of angioplasty catheters

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**Table 1. Frequency of target vessels.**

<table>
<thead>
<tr>
<th>Number of vessels</th>
<th>LAD</th>
<th>CX</th>
<th>RCA</th>
<th>OM</th>
<th>Ramus</th>
<th>PDA</th>
<th>SVG on OM</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>125</td>
<td>20</td>
<td>15</td>
<td>2</td>
<td>1</td>
<td>–</td>
<td>2</td>
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<tr>
<td>Two</td>
<td>59</td>
<td>10</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Three</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>188</td>
<td>32</td>
<td>24</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

LAD = left anterior descending; CX: circumflex; RCA = right coronary artery; OM = obtus marginatum; PDA = posterior descending artery; SVG = saphenous vein graft.
Table 2. Frequency of each stent brand based on the target vessels.

<table>
<thead>
<tr>
<th>Stent brand</th>
<th>LAD</th>
<th>CX</th>
<th>RCA</th>
<th>OM</th>
<th>Ramus</th>
<th>PDA</th>
<th>SVG on OM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVE</td>
<td>70</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>88</td>
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<td>Nexus</td>
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<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>72</td>
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<tr>
<td>Bio</td>
<td>22</td>
<td>7</td>
<td>21</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>–</td>
<td>51</td>
</tr>
<tr>
<td>Tetra</td>
<td>30</td>
<td>6</td>
<td>3</td>
<td>–</td>
<td>–</td>
<td>2</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>Cordis</td>
<td>1</td>
<td>–</td>
<td>2</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>6</td>
</tr>
<tr>
<td>Jomed</td>
<td>2</td>
<td>–</td>
<td>1</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>188</td>
<td>24</td>
<td>24</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>266</td>
</tr>
</tbody>
</table>

LAD = left anterior descending; CX = circumflex; RCA = right coronary artery; OM = obtus marginatum; PDA = posterior descending artery; SVG = saphenous vein graft.

needed.

In a study by Rahel et al11 61 consecutive patients were enrolled. Direct stenting was successful in 81% of patients. Angiographic follow-up was performed six months later on 51 (84%) of the 61 patients. Restenosis occurred in 8% of the direct stenting group.

In a study by Martinez-Elbal et al12 on 416 patients (446 lesions), either direct stent implantation or stent implantation following balloon predilatation were performed. Patients with age < 75 years, heavily calcified lesions, bifurcations, total occlusions, left main artery lesions, and those with very tortuous vessels were excluded from the study. Direct stenting was successful in 217 (96.8%) of 224 lesions. No single loss or embolization of the stent occurred. Fluoroscopy and procedural time were significantly lower in direct stenting. Major adverse cardiac events during hospitalization occurred only in one patient with direct stenting. Angiographic reevaluation at six months was performed in 94% of the cases. The restenosis rate was 16.5% in direct stenting. Finally, the authors concluded that, direct stenting is as safe as predilated stenting in selected coronary lesions and the overall success rate, midterm clinical outcome, and restenosis are similar with both techniques.

Baim et al13 in a study on 399 patients demonstrated that, although direct stenting was safe and highly successful, it offered only modest cost savings and no reduction in late restenosis was observed as compared with stenting after predilatation.

With regard to the above-mentioned studies, our immediate success (99%) and complication rate (0%) surpass the previous studies. This can be justified due to operator’s experience, a well-trained team, careful case selection, and a well-equipped center. On the other hand, the rate of restenosis was different in the reviewed studies (8% – 16%). Regarding this issue, we believe that although our results (14%) were acceptable, they might be affected by the small number of patients who attended the follow-up program (70%).

In conclusion, direct stenting is a novel, safe, and feasible approach in percutaneous treatment of coronary artery lesions. Moreover, direct coronary stenting can reduce the radiation exposure, costs of hospitalization and duration of procedure, and it is therefore, better for both the operator and patients.

References

