Contemporary Percutaneous Coronary Intervention Versus Balloon Angioplasty for Multivessel Coronary Artery Disease

A Comparison of the National Heart, Lung and Blood Institute Dynamic Registry and the Bypass Angioplasty Revascularization Investigation (BARI) Study

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Background—This investigation compares the results of contemporary percutaneous coronary intervention (PCI) with standard balloon angioplasty among patients with multivessel coronary disease. Patients having balloon angioplasty in the Bypass Angioplasty Revascularization Investigation (BARI) and those within the Dynamic Registry meeting BARI eligibility criteria were studied.

Methods and Results—Clinical features and in-hospital and 1-year outcomes of 857 BARI-eligible patients in the Dynamic Registry (contemporary PCI) were compared with the 904 randomized patients who underwent percutaneous transluminal coronary angioplasty in BARI. Compared with BARI patients, Registry patients had fewer lesions attempted (1.53 versus 2.56, \( P < 0.001 \)), more frequent single-vessel PCI (76% versus 33%, \( P < 0.001 \)), greater use of intracoronary stents (76% versus 1%, \( P < 0.001 \)), and GP IIb/IIIa receptor antagonist (24% versus 0%, \( P < 0.001 \)). Angiographic success was achieved more often among Registry patients (91% versus 72%, \( P < 0.001 \)), whereas abrupt closure (1.5% versus 9.5%, \( P < 0.001 \)) and in-hospital coronary artery bypass graft (CABG) (1.9% versus 10.2%, \( P < 0.001 \)) and myocardial infarction (0.8% versus 2.1%, \( P = 0.025 \)) were less common. No differences were observed in either in-hospital or 1-year death, but 1-year death/myocardial infarction was lower in the Registry. Registry patients had lower 1-year rates of subsequent CABG (8.6% versus 22.7%, \( P < 0.001 \)) and PCI (12.4% versus 22.5%, \( P < 0.001 \)). By multivariate analysis, contemporary PCI was independently associated with reduced risk for in-hospital CABG, 1-year CABG, and 1-year PCI.

Conclusions—Among patients with multivessel disease, contemporary PCI resulted in safer and more durable revascularization. These results support the role of PCI for selected patients with multivessel coronary artery disease. (Circulation. 2002;106:1627-1633.)

Key Words: angioplasty ■ coronary disease ■ stents ■ registries ■ trials

The Bypass Angioplasty Revascularization Investigation (BARI) compared coronary angioplasty to coronary artery bypass surgery (CABG) in a selected cohort of patients with multivessel coronary artery disease (CAD) at a time when coronary intervention was limited to balloon angioplasty alone. At 5 years, survival was similar regardless of revascularization strategy, although angioplasty patients often required a repeat procedure or a subsequent CABG. In the subgroup of patients with diabetes, survival was better with CABG.

Coronary angioplasty has evolved since this comparison, and present percutaneous coronary interventions (PCIs) often include the use of stents and new pharmacological adjuncts. How contemporary PCI compares with balloon angioplasty in patients with multivessel CAD is unknown. The National Heart, Lung and Blood Institute (NHLBI) Dynamic Registry captures patient characteristics, procedural practices, and in-hospital and 1-year outcomes of patients...
having contemporary PCI at a cross section of North American medical centers. The purpose of this investigation was to compare the application and results of contemporary PCI to those of standard balloon angioplasty for patients with multivessel disease. Patients having angioplasty attempted in BARI and a selected subset of patients in the Dynamic Registry satisfying BARI eligibility criteria comprised the study cohort.

Methods

In BARI, patients were required to have severe angina, documented ischemia requiring revascularization, and angiographically documented multivessel coronary artery disease amenable to revascularization by balloon angioplasty (percutaneous transluminal coronary angioplasty [PTCA]) and by CABG. Patients were enrolled between August 1988 and August 1991 at 18 clinical centers in the United States and Canada. Patients with acute myocardial infarction, prior revascularization by PTCA or CABG, or left main disease were excluded. Of 4107 eligible patients, 1829 were randomized to either initial PTCA or CABG. Of the 915 patient assigned to an initial strategy of PTCA, 904 had PTCA attempted.

In BARI, demographic, clinical history, and angiographic baseline and initial procedure data were collected. For the entire study, a central laboratory evaluated all ECGs, including protocol-mandated postprocedural and annual ECGs, and determined the occurrence of myocardial infarction (MI). The clinical sites and a central angiographic laboratory analyzed baseline and procedural cardiac angiograms. Because only clinical site interpretations were obtained for the Dynamic Registry, all BARI angiographic data presented in this report are based on clinical site readings. Follow-up visits were conducted after procedure and at 1, 3, and 5 years; telephone follow-ups were conducted at 6 months, 2 years, and 4 years. The primary end point was mortality at 5 years; MI and subsequent revascularization procedures were prespecified secondary end points.

The NHLBI Dynamic Registry enrolls consecutive patients undergoing PCI at 15 clinical centers in North America during prespecified time intervals. Five clinical sites participated in both BARI and the Dynamic Registry, and all clinical sites were university-affiliated tertiary care medical centers. Demographic, clinical history, and baseline angiographic data, procedural data during the index PCI hospitalization, and 1-year follow-up data are collected. In this investigation, we identified patients in the Dynamic Registry who were enrolled in 2 waves, in 1997 to 1998 and in 1999, and fulfilled eligibility criteria for BARI (n=857). In particular, patients were included if they had multivessel coronary artery disease without significant left main disease and without prior PCI or CABG and in whom revascularization was not performed in the setting of acute MI. This contemporary BARI-eligible Dynamic Registry patient population was compared with the 904 BARI patients who received their assigned PTCA treatment.

Definitions

Lesion success was defined as the successful dilation of a lesion such that the absolute decrease in stenosis was 20% or more and the final postprocedural stenosis was <50%. Angiographic success was defined as none if no attempted lesions were successfully dilated according to the definition of lesion success given above, partial if at least 1 but not all attempted lesions were successfully dilated, or total if all attempted lesions were successfully dilated. Completeness of revascularization was defined as the number of lesions successfully treated being greater than or equal to the number of significant lesions at baseline. For this analysis, the criteria used for diagnosing MI in hospital and during follow-up were similar to the MI definition used for BARI. In the 96 hours after the revascularization procedure, MI was defined as the presence of a new Q wave on the postprocedural ECG, after the 96 hours, Q-wave and non-Q-wave MIs (identified on the basis of enzymes, chest pain, or ECG changes) were counted. Definitions of other end points have been described previously.

Statistical Methods

Baseline and procedural characteristics for the BARI-PTCA group and the Dynamic Registry were compared with χ² statistics for categorical data and t tests or Wilcoxon nonparametric tests for continuous data, according to the normality of the data. In-hospital outcomes were compared using χ² statistics, and multivariate logistic regression models were used to adjust for important differences in the baseline profiles between the two studies.

The length of follow-up for BARI and the Dynamic Registry were different; therefore, all long-term outcome data for both studies were censored at 1 year. One-year event rates were estimated with Kaplan-Meier curves and compared using log-rank statistics. Cox proportional hazards models were used to compare the 1-year outcome, adjusting for baseline differences between the two study populations. Proportional hazards assumptions were checked. For both multivariate logistic and Cox regression models, standard stepwise procedures were used to select baseline variables that were independently associated with the outcome, and then the study variable (ie, Dynamic Registry versus BARI) was added to this model. Because some variables were associated with the outcomes and were unbalanced in the 2 populations, a few predictor variables became statistically nonsignificant after adding the study variable. These statistically nonsignificant confounders were left in the model to account for important population differences. Variables that were specific to the procedures undertaken, and their short-term outcomes (eg, stent use, GP IIb/IIIa use, number of attempted lesions, abrupt closure, and dissection) were not included in the multivariate models, because these are the part of the difference that we intended to measure by comparing BARI and the Dynamic Registry.

Finally, to explore what specific procedural changes were associated with the 1-year clinical outcomes, stepwise methods were used to select baseline covariates for Cox regression models for 1-year mortality, CABG, and subsequent PCI outcomes for patients who were free of in-hospital death, MI, and CABG (n=1630, 92.6%). Then, intracoronary stent use, GP IIb/IIIa use, and number of attempted lesions were allowed to enter these models in a stepwise fashion.

Results

Baseline Characteristics

Baseline characteristics of BARI-eligible Dynamic Registry patients and BARI-PTCA patients are presented in Table 1. Dynamic Registry patients were significantly older. Registry patients were more often treated for diabetes and had more hypertension but were less likely to have experienced a prior MI. Patients in the Dynamic Registry were also more often asymptomatic and less often presented with unstable angina than in BARI-PTCA. On angiography, the number of significant lesions, their distribution in individual arterial segments, and the frequency of total occlusions were similar between the two groups, yet triple-vessel disease and proximal LAD disease were less frequent in the Dynamic Registry.

The characteristics of attempted coronary lesions differed between the two groups in several respects (Table 2). In the Dynamic Registry, most attempted lesions were located in the right coronary artery compared with the left anterior descending artery compared with BARI-PTCA. Mean reference vessel diameter was larger and preprocedural percentage stenosis more severe in the Dynamic Registry. The proportion of attempted lesions that were total occlusions, ostial lesions, bifurcation lesions, calcification, and thrombus was greater in the Dynamic Registry.
TABLE 1. Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>BARI-Eligible Dynamic Registry (n=857)</th>
<th>BARI-PTCA (n=904)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age, y</td>
<td>63.6</td>
<td>61.8</td>
<td>0.002</td>
</tr>
<tr>
<td>Females, %</td>
<td>30</td>
<td>27</td>
<td>0.28</td>
</tr>
<tr>
<td>Treated diabetes, %</td>
<td>23</td>
<td>19</td>
<td>0.047</td>
</tr>
<tr>
<td>Oral medications only</td>
<td>14</td>
<td>10</td>
<td>0.001</td>
</tr>
<tr>
<td>Insulin</td>
<td>8</td>
<td>8</td>
<td>0.99</td>
</tr>
<tr>
<td>Prior MI, %</td>
<td>34</td>
<td>54</td>
<td>0.001</td>
</tr>
<tr>
<td>History of congestive heart failure, %</td>
<td>8</td>
<td>9</td>
<td>0.43</td>
</tr>
<tr>
<td>History of hypertension, %</td>
<td>62</td>
<td>49</td>
<td>0.001</td>
</tr>
<tr>
<td>Ejection fraction&lt;50%, %</td>
<td>24 (n=626)</td>
<td>19 (n=808)</td>
<td>0.014</td>
</tr>
<tr>
<td>Angina status</td>
<td>...</td>
<td>...</td>
<td>0.003</td>
</tr>
<tr>
<td>Stable, %</td>
<td>32</td>
<td>31</td>
<td>...</td>
</tr>
<tr>
<td>Unstable, %</td>
<td>56</td>
<td>61</td>
<td>...</td>
</tr>
<tr>
<td>Asymptomatic, %</td>
<td>12</td>
<td>7</td>
<td>...</td>
</tr>
<tr>
<td>Mean number of significant lesions</td>
<td>3.22</td>
<td>3.18</td>
<td>0.66</td>
</tr>
<tr>
<td>Triple-vessel disease, %</td>
<td>29</td>
<td>39</td>
<td>0.001</td>
</tr>
<tr>
<td>Significant proximal LAD disease, %</td>
<td>29</td>
<td>40</td>
<td>0.001</td>
</tr>
<tr>
<td>Presence of total occlusion, %</td>
<td>33</td>
<td>29</td>
<td>0.12</td>
</tr>
</tbody>
</table>

**Procedural Comparison**

Considerable differences in procedural characteristics between Dynamic Registry and BARI-PTCA were observed (Table 2). Compared with BARI-PTCA, fewer lesions per patient were attempted (1.53 versus 2.56, P<0.001) on average in the Dynamic Registry, with more single-vessel angioplasty attempted (76% versus 33%, P<0.001). The proportions of patients with total occlusion attempts were similar in the two studies. Intracoronary stents (76% versus 1%, P<0.001) and GP IIb/IIIa receptor antagonists (24% versus 0%, P<0.001) were used almost exclusively in the Dynamic Registry. The incidence of dissection was similar in the two groups (11% versus 9%, P=0.072). On a lesion basis, successful dilation was achieved more often after PCI in the Dynamic Registry (93% versus 86%, P<0.001), and final diameter stenosis (12% versus 29%, P<0.001) was less severe. On a patient basis, complete angiographic success was achieved more often (91% versus 72%, P<0.001) in the Dynamic Registry group.

**Clinical Outcomes**

In-hospital mortality (0.9% versus 1.1%, P=0.72) was similar between the two patient groups (Table 3). However, the incidence of abrupt closure (1.5% versus 9.5%, P<0.001), in-hospital CABG (1.9% versus 10.2%, P<0.001), and in-hospital MI (0.8% versus 2.1%, P=0.025) were significantly lower in the Dynamic Registry. There was a trend suggesting that in-hospital death/MI (1.6% versus 3.0%, P=0.060) was also lower in the Dynamic Registry. No differences were observed in 1-year mortality (4.9% versus 4.1%, P=0.47, Figure 1), whereas the estimated 1-year rate for the combined end point of death/MI was significantly lower in the Dynamic Registry (7.9% versus 11.0%, P=0.036, Figure 2). The need for subsequent CABG (8.6% versus 22.7%, P<0.001), repeat PCI (12.4% versus 22.5%, P<0.001), or either type of revascularization over the course of follow-up (19.4% versus 40.7%, P<0.001, Figure 3) was less frequent in the Dynamic Registry.

**Multivariate Analysis**

Participation in the Dynamic Registry was an independent predictor of the low in-hospital risk for both CABG (OR 0.18; 95% CI, 0.10 to 0.30; P<0.001, Table 4) and the composite of death/MI/CABG (OR 0.45; 95% CI, 0.31 to 0; P<0.001). In multivariate model for 1-year outcomes (Table 5), enrollment in the Dynamic Registry was associated with a reduced risk for subsequent CABG (RR 0.35; 95% CI, 0.26 to 0.48; P<0.001), PCI (RR 0.56; 95% CI, 0.43 to 0.71; P<0.001), or combined PCI/CABG (RR 0.41; 95% CI, 0.33 to 0.51; P<0.001) compared with being in the BARI-PTCA group. Although not statistically significant, the trends observed in the multivariate models for in-hospital death/MI (OR 0.58; 95% CI, 0.30 to 1.15; P=0.12) and for 1-year death/MI (RR 0.74; 95% CI, 0.53 to 1.03; P=0.07) indicate that fewer MIs occurred in the Dynamic Registry. No differences in either in-hospital or 1-year mortality were observed after adjustment for baseline differences.

In an attempt to identify procedural changes that were related to 1-year outcomes, the impact of intracoronary stent use and GP IIb/IIIa receptor antagonist use and number of attempted lesions were analyzed in the group of BARI-PTCA and BARI-eligible Dynamic Registry patients who were free from in-hospital death, MI, and CABG. None of these 3 procedural variables was significantly related to 1-year mortality in this population. Use of GP IIb/IIIa receptor antagonists was not significantly related to 1-year CABG or PCI rates. Using a multivariate Cox model, intracoronary stent use was associated with a 49% reduction for 1-year CABG (RR...
and each additional lesion attempted was associated with a 16% reduction for 1-year CABG (RR 0.84; 95% CI, 0.73 to 0.97; P = 0.02).

Using another multivariate Cox model, intracoronary stent use was associated with a 38% reduction for 1-year PCI (RR 0.62; 95% CI, 0.46 to 0.82; P = 0.001), and each additional lesion attempted was associated with an 11% increase in 1-year PCI (RR 1.11; 95% CI, 1.01 to 1.23; P = 0.033).

**Discussion**

This comparison of contemporary PCI and BARI-PTCA demonstrated important differences in patient selection, procedural characteristics, and clinical outcomes between the two groups. In the setting of multivessel disease, contemporary PCI patients were older, with increased comorbidities and unfavorable angiographic characteristics. Despite these baseline differences, contemporary PCI achieved higher rates of angiographic success and lower rates of procedural complications, such as abrupt closure of the treated artery. Additionally, there were major differences related to the strategy of performing revascularization. Contemporary PCI was characterized by a greater usage of intracoronary stent and GP IIb/IIIa inhibitors.

Among the BARI-like Registry patients, PCI was performed with greater selectivity with regard to the number of lesions attempted. Predominantly 1- or 2-vessel PCI was performed in the Registry group, and fewer lesions per patient were attempted. This more judicious approach suggests that PCI operators now believe that functional improvement can be achieved by selectively treating coronary obstructions that are in large arteries supplying major areas of viable myocardium. Other distal lesions or lesions in vessels supplying necrotic or small areas of myocardium may not warrant revascularization to relieve symptoms and evidence of ischemia.
mia. Such a philosophy is in accordance with recently published practice guidelines.12

The major clinical impact of contemporary PCI detected in this investigation was that the safety and durability of PCI was enhanced. Registry patients experienced a substantially lower rate of in-hospital MI. This was likely attributable to the lower rate of periprocedural abrupt coronary closure. Importantly, this difference favoring Registry patients was sustained through 1 year.

Enhanced durability of contemporary PCI was reflected in less need to perform repeat revascularization over 1 year of follow-up. One-year rate for repeat revascularization in the BARI-PTCA group was 40.7%, a value similar to those observed in other contemporaneous trials of PTCA in patients with multivessel disease.13 In comparison, the estimated rate for BARI-like Registry patients was 19.4%. This difference was attributable to declines in both repeat PCI and subsequent CABG. Our multivariate regression analysis indicated this benefit could be ascribed to the use of stents in the Registry cohort. Initial evaluations of stents in highly selected patients with simple coronary disease demonstrated an approximately one third reduction in restenosis compared with balloon angioplasty alone.4,5 Our results suggest that this benefit now extends to the broader population of patients with multivessel CAD and complex lesions.

Two clinical trials have compared PCI performed in the stent era to CABG for patients with multivessel disease. The 1-year rate for repeat revascularization we observed among BARI-like Registry patients was similar to rates reported in the Argentine Randomized Study: Coronary angioplasty with stenting vs. coronary bypass surgery in multivessel disease (ERACI-II) and the Arterial Revascularization Therapy Study (ARTS) (16.8% and 21.0%, respectively).14,15 With the availability of stents that elute drugs inhibiting neointimal hyperplasia, the rate of repeat revascularization should be reduced additionally.16

<table>
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<th>TABLE 3. In-Hospital/One-Year Clinical Outcomes</th>
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<tr>
<td>BARI-Eligible Dynamic Registry (n=857)</td>
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<tr>
<td>In Hospital, % (n)</td>
</tr>
<tr>
<td>Death</td>
</tr>
<tr>
<td>MI</td>
</tr>
<tr>
<td>Death/MI</td>
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<tr>
<td>CABG</td>
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<tr>
<td>Death/MI/CABG</td>
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<tr>
<td>One Year, %</td>
</tr>
<tr>
<td>Death</td>
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<tr>
<td>Death/MI</td>
</tr>
<tr>
<td>CABG</td>
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<tr>
<td>PCI</td>
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<tr>
<td>CABG/PCI</td>
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Figure 1. Kaplan-Meier estimate of survival up to 1 year after initial PCI in BARI-PTCA and in the BARI-eligible subgroup of the Dynamic Registry.

BARI-PTCA versus BARI Eligible Dynamic Registry
One-Year Survival

Figure 2. Kaplan-Meier estimate of survival free of MI up to 1 year after initial PCI in BARI-PTCA and in the BARI-eligible subgroup of the Dynamic Registry.

BARI-PTCA versus BARI Eligible Dynamic Registry
Time to First Subsequent Procedure

Figure 3. Kaplan-Meier estimate of time to first subsequent revascularization, including CABG or PCI, after the initial hospitalization in BARI-PTCA and in the BARI-eligible subgroup of the Dynamic Registry.
In contrast to stent usage, we detected no effect of GP IIb/IIIa administration on the incidence repeat revascularization. This finding supports that of a prior randomized trial evaluating the effectiveness of abciximab.17

We observed no difference in death between the two patient groups despite reducing the incidence of repeat revascularization among contemporary PCI patients. This study had reasonable power (70%) to detect a marked difference in 1-year mortality if it had existed between the two studies (ie, a 50% reduction from 4.1% mortality). These observations suggest that the mechanisms for death after PCI may relate to other aspects of coronary artery disease than treatment of lesions responsible for acute or chronic ischemia. Efforts to identify vulnerable plaques whose initial clinical manifestations may be death or MI are being explored along with possible treatment options.18 Whether PCI as presently applied has a role in the treatment of these nonsignificant but potentially threatening lesions is a subject warranting additional investigation.

### Limitations

Although the clinical institutions in both the Dynamic Registry and BARI were similar and eligibility criteria from BARI were used to select BARI-eligible patients in the Dynamic Registry, BARI patients were enrolled in a clinical trial with options for either surgical revascularization or PTCA whereas the Dynamic Registry included only patients selected for PCI. Meaningful differences might exist between the BARI-PTCA and Dynamic Registry patients that were not identified when adjusting for baseline differences, and such imbalances may have altered our findings. Finally, in BARI, MI classification was based on central laboratory evaluation using enzymes, symptoms, and ECG results that were collected at specified time points, whereas in the Dynamic Registry, MI was documented when symptoms were observed.

<table>
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<tr>
<th>TABLE 4. Multivariate Adjusted* In-Hospital Outcomes</th>
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<tbody>
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<td>Variable</td>
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</table>
| In-hospital death
  Dynamic registry vs BARI-PTCA | 0.82 (0.32, 2.13) | 0.69 |
  Renal dysfunction | 9.12 (299, 27.8) | 0.001 |
  Congestive heart failure | 3.05 (1.00, 9.26) | 0.049 |
| In-hospital death/MI
  Dynamic registry vs BARI-PTCA | 0.58 (0.30, 1.15) | 0.12 |
  Renal dysfunction | 4.26 (1.65, 11.03) | 0.0028 |
  Prior MI | 2.55 (1.29, 5.04) | 0.0069 |
  Peripheral vascular disease | 2.37 (1.03, 5.43) | 0.041 |
  No. significant lesions | 1.36 (1.06, 1.73) | 0.015 |
| In-hospital CABG
  Dynamic registry vs BARI-PTCA | 0.18 (0.10, 0.30) | 0.001 |
  Triple-vessel disease | 1.59 (1.07, 2.37) | 0.023 |
  Total occlusion attempt | 1.59 (0.96, 2.62) | 0.070 |
| In-hospital death/MI/CABG
  Dynamic registry vs BARI-PTCA | 0.28 (0.18, 0.42) | 0.001 |
  Triple-vessel disease | 1.46 (1.01, 2.11) | 0.042 |
  Total occlusion attempt | 1.76 (1.12, 2.76) | 0.014 |
  Peripheral vascular disease | 1.67 (0.96, 2.91) | 0.069 |

*Potential variables: age, sex, race, diabetes status, prior MI, congestive heart failure, hypertension, malignancy, pulmonary disease, cerebrovascular disease, pulmonary vascular disease, renal dysfunction, angina, smoking status, triple-vessel disease, number significant lesions, total occlusion, lesion location (proximal LAD, LAD, right coronary artery, and left circumflex artery, attempted lesion characteristics (calculated, bifurcation, ostial, thrombus, tortuosity, total occlusion, Class C).

<table>
<thead>
<tr>
<th>TABLE 5. Multivariate Adjusted* One-Year Outcomes</th>
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<tbody>
<tr>
<td>Variable</td>
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</table>
| One-year death
  Dynamic registry vs BARI-PTCA | 1.13 (0.71, 1.82) | 0.60 |
  Renal dysfunction | 3.54 (1.90, 6.62) | 0.001 |
  Congestive heart failure | 2.75 (1.57, 4.81) | 0.001 |
  Diabetes—insulin | 4.64 (2.57, 8.38) | 0.001 |
  Diabetes—oral drugs | 2.12 (1.14, 3.93) | 0.018 |
  Age (10 y) | 1.38 (1.09, 1.76) | 0.008 |
  Female sex | 0.53 (0.31, 0.93) | 0.026 |
| One-year death/MI
  Dynamic registry vs BARI-PTCA | 0.74 (0.53, 1.03) | 0.070 |
  Renal dysfunction | 3.41 (2.09, 5.56) | 0.001 |
  Congestive heart failure | 1.97 (1.30, 3.00) | 0.0015 |
  Diabetes—insulin | 1.87 (1.23, 2.85) | 0.0036 |
  Prior MI | 1.41 (1.02, 1.94) | 0.039 |
  No. significant lesions | 1.19 (1.05, 1.35) | 0.0057 |
  White race | 0.67 (0.44, 1.03) | 0.068 |
| One-year CABG
  Dynamic registry vs BARI-PTCA | 0.35 (0.26, 0.48) | 0.001 |
  No. significant lesions | 1.21 (1.08, 1.36) | 0.001 |
  Total occlusion attempt | 1.37 (1.00, 1.88) | 0.047 |
  Triple-vessel disease | 1.18 (0.89, 1.57) | 0.25 |
  Proximal LAD disease | 1.17 (0.92, 1.50) | 0.20 |
| One-year PCI
  Dynamic registry vs BARI-PTCA | 0.56 (0.43, 0.71) | 0.001 |
  Nonsmoker | 1.44 (1.13, 1.84) | 0.003 |
  Proximal LAD disease | 1.33 (1.05, 1.69) | 0.018 |
  Ostial lesion attempt | 0.57 (0.33, 0.97) | 0.040 |
| One-year CABG/PCI
  Dynamic registry vs BARI-PTCA | 0.41 (0.33, 0.51) | 0.001 |
  Treated diabetes | 1.33 (1.08, 1.64) | 0.006 |
  Triple-vessel disease | 1.37 (1.14, 1.64) | 0.001 |
  Proximal LAD disease | 1.23 (1.03, 1.47) | 0.023 |
  Age (10 y) | 0.94 (0.86, 1.03) | 0.21 |

*Potential variables: age, sex, race, diabetes status, prior MI, congestive heart failure, hypertension, malignancy, pulmonary disease, cerebrovascular disease, pulmonary vascular disease, renal dysfunction, angina, smoking status, triple-vessel disease, number significant lesions, total occlusion, lesion location (proximal LAD, LAD, right coronary artery, and left circumflex artery, attempted lesion characteristics (calculated, bifurcation, ostial, thrombus, tortuosity, total occlusion, Class C).
Conclusions
Contemporary PCIs for multivessel CAD have evolved since coronary angioplasty in BARI. Contemporary PCI was attempted for more complex lesions but with a more judicious approach with regard to extent of revascularization. Use of intracoronary stents seems to have significantly reduced the periprocedural risks of PCI and need for repeat revascularization. A reduction in in-hospital and 1-year mortality was not observed. Enhancement of survival from PCI will likely require a different application of this form of revascularization or the broadening of therapeutic effects achievable beyond the relief of coronary narrowing.

Acknowledgment
The authors acknowledge the secretarial assistance of Arlene S. Grant in preparing this manuscript.

References
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_Circulation_. 2002;106:1627-1633; originally published online September 9, 2002;
doi: 10.1161/01.CIR.0000031570.27023.79

_Circulation_ is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

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