compliance plays an important role in explaining, and potentially determining the diameter of the abdominal aorta and may thus be a new index to early recognize people at higher risk of AAA.

**Key points**

- Arterial compliance is an important predictor of aortic diameter before the development of AAA.
- This study suggests a possible utilization of PWV for early identification of subjects with an increased risk of developing AAA.

**Conflicts of interest**

There are no conflicts of interest to declare.

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**References**


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**PCI in octogenarians—our centre ‘real world’ experience**

SIR—The safety and outcomes of PCI (percutaneous coronary intervention) over the last few years have improved dramatically due to advanced stent technology and...
pharmacological treatments. One enlarging group remains a challenge: the very elderly. The very elderly (≥80 years) are increasingly being referred for revascularisation for both stable coronary disease and acute coronary syndromes (ACS) [1]. The challenges for treating patients with advanced age are associated with the higher burden of comorbidity and more advanced complexity of coronary lesions [2–4].

There are scarce data on interventional outcomes in the elderly as many trial protocols exclude this age group, and the available data for longer term outcomes with intervention are limited by small sample sizes [5]. Indeed, the average ages of invasively treated patients in FRISC-II and TIMI-18 were only 66 and 62, respectively [6, 7].

A recent randomised trial of patients older than 75 with chronic stable angina has shown that revascularisation is superior to medical therapy and more cost effective [8, 9]. In ACS trials, of those treated conservatively, elderly patients were found to have higher mortality than younger patients [10, 11].

An interesting dilemma has developed in the elderly group: their coronary anatomy is more complex and they have higher restenosis rates with bare metal stents (BMS) than younger patients [12], which would suggest that drug-eluting stents (DES) should have a greater role in their treatment, yet the concerns regarding the bleeding complications associated with prolonged courses of dual antiplatelet drugs may mean that this is not the case.

The aims of this paper using a database of 7,348 patients (of which 526 were 80 years or older) treated at a single, high-volume PCI centre were to

(i) characterise the very elderly (≥80 years) population undergoing PCI in terms of clinical and angiographic characteristics and 30-day and long-term outcomes in comparison to those <80 years and

(ii) assess DES usage in comparison to BMS in the population ≥80 years in terms of clinical and angiographic characteristics and outcomes.

### Methods

Details of all patients treated with PCI at a single, high-volume, tertiary centre by PCI between 17 June 1999 and 30 November 2005 were prospectively collected by being entered onto a database [Patient Activated Tracking System (PATS), Dendrite Ltd] at the time of the procedure by the primary operator. We carried out a retrospective analysis of these data. Patients recorded as cardiogenic shock were not included in the analysis (n = 68).

Baseline clinical and angiographic characteristics were recorded. Patients were followed up using telephone calls and questionnaires. All-cause mortality was calculated using data from the UK Government Office of National Statistics.

Patients were evaluated for procedural success, 30-day mortality, 30-day major adverse cardiac events (MACE) [defined as mortality, Q-wave myocardial infarction (MI) and target vessel revascularisation (TVR)] and in-hospital major bleeding complications (defined as bleed requiring two-unit transfusion), and 1-year mortality, coronary artery bypass graft operation (CABG) and MACE rates. Procedural success was defined as ≤20% residual stenosis in the target lesion post-stent implantation without the occurrence of MI, urgent CABG or death.

We divided the patients into subgroups for analysis. Firstly, all patients were divided into those <80 and those ≥80 years, and secondly, a separate subgroup analysis was carried out of these elderly patients treated with DES from 2003 (when DES were routinely available). This group was compared with patients ≥80 years treated with BMS and those <80 years treated with DES.

### Statistical analysis

Differences between groups were evaluated by the chi-square test for categorical data or the two-tailed Student t test for continuous data. Differences were considered significant for P-values <0.05.
Table 2. Patient characteristics and outcomes in all patients <80 treated with DES (1,345) and in those ≥80 years treated with BMS (240) and DES (95)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>BMS (240) Patients ≥80 years</th>
<th>DES (95) Patients ≥80 years</th>
<th>DES (1,345) Patients &lt;80 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years, mean ± SD)</td>
<td>82.9 (±2.6)</td>
<td>82.5 (±2.4)</td>
<td>62.8 (±9.9) (^\dagger)</td>
</tr>
<tr>
<td>Sex (male) (%)</td>
<td>55.0</td>
<td>54.7</td>
<td>72.6</td>
</tr>
<tr>
<td>Elective (%)</td>
<td>37.9*</td>
<td>48.4</td>
<td>38.4</td>
</tr>
<tr>
<td>LV function &lt;30% (%)</td>
<td>4.2</td>
<td>4.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>12.1</td>
<td>11.6</td>
<td>15.0 (^\dagger)</td>
</tr>
<tr>
<td>No of vessels treated (%)</td>
<td>67.1</td>
<td>64.2</td>
<td>66.8</td>
</tr>
<tr>
<td></td>
<td>29.6</td>
<td>32.6</td>
<td>29.3</td>
</tr>
<tr>
<td></td>
<td>3.3</td>
<td>3.2</td>
<td>3.5</td>
</tr>
<tr>
<td>AHA Grade (%) A/B/C</td>
<td>29.9*</td>
<td>17.1</td>
<td>26 (^\dagger)</td>
</tr>
<tr>
<td></td>
<td>43.5</td>
<td>39.6</td>
<td>44.1</td>
</tr>
<tr>
<td></td>
<td>26.2</td>
<td>40.5</td>
<td>29.1</td>
</tr>
<tr>
<td>LMS (%) involvement</td>
<td>3.3*</td>
<td>14.7</td>
<td>3.8 (^\dagger)</td>
</tr>
<tr>
<td>Vessel size (mm) (mean ± SD)</td>
<td>3.1</td>
<td>3.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Procedural success (%)</td>
<td>98</td>
<td>98.1</td>
<td>98.6</td>
</tr>
<tr>
<td>MACE (%) 30 days</td>
<td>2.9</td>
<td>2.1</td>
<td>0.5 (^\dagger)</td>
</tr>
<tr>
<td>MACE (%) 1 year</td>
<td>15.8</td>
<td>11.6</td>
<td>5.2</td>
</tr>
<tr>
<td>TVR 1 year (%)</td>
<td>5.0</td>
<td>4.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Death (%) 30 days</td>
<td>2.5</td>
<td>1.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Death (%) 1 year</td>
<td>8.8</td>
<td>6.3</td>
<td>1.3 (^\dagger)</td>
</tr>
<tr>
<td>CABG 1 year (%)</td>
<td>4.2</td>
<td>0</td>
<td>0.7</td>
</tr>
<tr>
<td>Major bleed (%)</td>
<td>0.8</td>
<td>1.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

*Represents a significant difference (P<0.05) when compared with patients ≥80 years with DES.
\(^\dagger\)Represents a significant difference (P<0.05) between BMS (240) ≥80 years and DES (1,345) <80 years.

AHA, American Heart Association; LMS, left main stem; DES, drug-eluting stents; MACE, major adverse cardiac events; TVR, target vessel revascularisation; CABG, coronary artery bypass grafting.

Results

Clinical characteristics and outcomes of ≥80 versus <80 years (Table 1)

In both groups, the majority of patients were male. There were significantly more women, impaired left ventricular function (LVEF ≤30%), multi-vessel and complex coronary disease and left main stem (LMS) involvement in the very elderly group. The majority of patients in both groups had single vessel angioplasty, and DES usage was similar in both groups.

Overall, there was a high rate of procedural success in both age groups. MACE and death rates at both 30 days and 1 year were significantly lower in the younger age group. In both groups, the rate of major in-hospital bleeds was low. The rates of TVR and CABG at 1 year were similar in both groups.

Clinical characteristics and outcomes of DES versus BMS (Table 2)

In the DES era (2003–05), there were 335 patients ≥80 years treated with PCI. Of these, 240 received BMS and 95 DES. This was in comparison to 1,345 patients <80 years who received DES in this time period. In patients ≥80 years, treatment with DES was more likely to be used for elective than acute cases, LMS involvement and more AHA Grade C lesions. DES in patients <80 years was associated with higher rates of diabetes and lower rates of lesion calcification, LMS involvement and AHA Grade C lesions in comparison to those ≥80 years.

Procedural success was high in all patients treated with DES. There was not a high rate of in-hospital major bleeds in any of the groups. There were no differences in 30-day and 1-year outcomes between the elderly patients treated with DES and BMS. In the patients ≥80 years treated with DES in comparison to the patients <80 years treated with DES, there were higher MACE rates at 30 days and death rate at 1 year.

Discussion

Patients who are 80 years or older comprise an increasing proportion of revascularisation procedures [12, 13]. Despite many patients being in splendid condition with little or no morbidity, age cannot be discounted, when decisions are made about revascularisation strategies. Significant comorbidity is influential in deciding treatment; however, one must not be swayed by the stereotypical and negative perceptions of elderly patients [14].

In our analysis, we found that the very elderly had a higher proportion of female patients, and were more likely to
have impaired LVEF, multi-vessel disease, LMS involvement and more complex coronary anatomy. We found that in the very elderly, PCI has a high degree of procedural success and an acceptable mortality and morbidity. In comparison to younger patients, those over 80 years had poorer outcomes, in terms of 30-day and 1-year mortality and MACE rates; however, our results are comparable to previous assessments of revascularisation in this age group [12, 15, 16]. There was no difference between the two groups in terms of TVR or CABG, despite higher rates of restenosis being reported in the very elderly previously [12].

The elderly have higher rates of peripheral artery disease leading to higher vascular access complications. This is probably reflected by the higher rate of in-hospital major bleeds in the very elderly, which was still acceptably low at 0.6%.

Not surprisingly, we found that very elderly patients had more complex coronary anatomy higher rates of multi-vessel disease than the younger group, which suggests that DES technology should have a major role. We found that DES usage in the elderly was more likely to be in elective cases, those with LMS involvement and those with more complex anatomy. There were no differences in terms of 30-day and 1-year outcome between the elderly patients treated with DES and those with BMS. Certainly, we can conclude that the use of DES in very elderly patients is as safe as BMS and this is maintained at 1 year. One concern about the use of DES in the elderly is the increased bleeding risk with prolonged dual antiplatelet use. Our analysis found that major in-hospital bleeds were not increased in the DES group. The long-term effects of dual antiplatelet therapy in this age group are unknown, but we found no increase in 1-year mortality. The use of DES in the very elderly is a difficult issue. Undoubtedly, their more complex coronary anatomy and previously reported higher rates of restenosis warrant their use. However, the prolonged courses of dual antiplatelet therapy may lead to excess bleeding risks. Furthermore, in the elderly, compliance to drug therapy can be a concern [17]. Therefore, the cardiologist has complex decisions to make before using DES in his/her patient. These issues require further analysis with a prospective randomised controlled trial.

Study limitations

There are limitations to this study. The sample size could be larger. The data, although prospectively collected, are retrospectively analysed, and due to the complex decisions involved in treating the elderly, there is significant operator variability which is difficult to account for.

Conclusion

Octogenarian patients who undergo PCI have an acceptable mortality and morbidity, despite more complex coronary disease than younger patients. Due to the complex nature of their coronary disease, the elderly may have more to gain from DES usage but require very careful consideration of each individual case. We found that the use of DES in very elderly patients is as safe as BMS and this is maintained at 1 year. Randomised controlled trials are required to shed more light on the treatment of this challenging group.

Key points

- Patients who are 80 years or older comprise an increasing proportion of revascularisation procedures.
- These patients are likely to have more complex coronary anatomy than younger patients.
- PCI has a high degree of procedural success and an acceptable mortality and morbidity in this group.
- The use of DES in these elderly patients is as safe as BMS, and this is maintained at 1 year.

Conflicts of interest

No conflicts of interest.

References

Postoperative myocardial damages after hip fracture repair are frequent and associated with a poor cardiac outcome: a three-hospital study

SIR—Long-term mortality after hip fracture repair (HFR) is high [1–3] and frequently caused by vascular death [4, 5–7]. Some data have pointed out that the onset of cardiac morbidity appears early in the course of hip fracture [8–10], but none have focused on the correlation between perioperative ischaemic complications and late cardiac outcome. In vascular surgery patients, studies have shown such a correlation especially by using Troponin measurement [11–16]. In a previous study, we have shown that this phenomenon exists also after hip surgery [17]. The incidence of a perioperative myocardial damage (PMD), as measured by troponin Ic (TnIc) release, was particularly high in the HFR population (22%) as were mortality (22%) and the incidence of major cardiac complications (MCC) (27%). To assess if this phenomenon was only due to the local recruitment of the institution in which the study was performed, the study was completed to include data from two other academic French institutions in which patients were also screened for a follow-up period of 6 months after surgery.

Methods

Following approval from each Local Research Ethics Committee, consecutive patients undergoing HFR were enrolled in three different institutions in this prospective, observational study after obtaining individual patient consent. Surgical procedures performed during off-duty hours were not included. All patients had a preoperative anaesthetic evaluation before surgery, and every effort was made to optimise any pathological process in <72 h. The patients were screened according to predefined criteria that included components of the Revised Cardiac Risk Index (RCRI) [18]. All cardiac treatments remained unchanged until surgery, except for angiotensin-converting enzyme inhibitors which were stopped before surgery. All cardiac medications were started again on the ward after surgery. HFR was performed under general, spinal or combined anaesthesia. Serum TnIc was measured on the morning of each of the first three postoperative days and was analysed using electrochemiluminescence immunoassay on an Ortho Vitros EG1 analyser (Ortho-Clinical Diagnostics, Raritan, NJ, USA) in two institutions and on a stratus II analyser (Dade-Behring, Paris La Défense, France) in the other one. Values greater than the upper reference limit specified by the manufacturer to be the 99th percentile concentration of a reference population [19] were considered positive. Namely, these values were respectively 0.08 ng/ml and 0.1 ng/ml.

The in-hospital follow-up was performed by the anaesthetist in charge of the orthopaedic ward, and data were collected prospectively. Patients were clinically assessed daily using a standardised form that included evaluation of chest pain and signs of cardiac failure. The long-term follow-up was performed using semi-structured telephone interviews with the patient, his or her family or the physician in charge of the nursing home, 6 months after surgery to seek for MCC, determine mortality and its cause and record any further hospitalisation using a standardised form. Primary endpoint was the occurrence of MCC defined as cardiac death, myocardial infarction, unstable angina, need for coronary revascularisation and congestive heart failure. When such an event was suspected during the telephone interview, the diagnosis was confirmed by contacting the physician in charge of the patient and accessing medical records. As secondary endpoint, all-cause death was used.

Univariate statistical analysis was performed to compare patients according to the occurrence (or not) of MCC in the first six postoperative months, and according to the occurrence of death from any cause during the first six