here is increasing interest in registry data to get a clear picture of contemporary practice in various fields, however many existing registries have significant limitations. The OPEN registry of PCI (percutaneous coronary intervention) used a large number of centres (42% of interventional centres in France) and thus is probably truly representative of national practice. In all centres, consecutive patients were taken during a short period of recruitment to ensure they were representative of the treated population. Follow up was 98.8% and the quality of data was validated by clinical research officers at each participating centre. In OPEN the goals were to define the practice. In all centres, consecutive patients were taken during a month follow up data were obtained for 3071 registry patients (98.8%).

Using all of the demographic, clinical, and procedural characteristics, a stepwise selection logistic regression procedure was performed. Factors predictive of death/Q-MI/vascualrisation were: acute MI < 12 hours (OR 4.1, 95% CI 2.3 to 7.5, p = 0.0001); cardiogenic shock (OR 8.0, 95% CI 3.0 to 21.2, p = 0.0001); procedure failure (OR 1.0, 95% CI 1.01 to 1.03, p = 0.009); number of stents (OR 1.4, 95% CI 1.1 to 1.8, p = 0.009); absence of β blockers (OR 2.0, 95% CI 1.2 to 3.3, p = 0.007); left anterior descending artery (OR 1.7, 95% CI 1.0 to 2.8, p = 0.047).

Factors predictive of bleeding complications, almost all of which related to the arterial access site were: age (OR 1.1, 95% CI 1.0 to 1.1, p = 0.0001); female sex (OR 2, 95% CI 1.2 to 3.4, p = 0.009); smoking (OR 2.6, 95% CI 1.6 to 4.3, p = 0.0002); post-procedural heparin (OR 2.0, 95% CI 1.3 to 3.1, p = 0.003); unstable angina (OR 2.3, 95% CI 1.4 to 3.9, p = 0.0007); MI < 12 hours (OR 2.4, 95% CI 1.2 to 4.6, p = 0.01); MI > 1 month (OR 2.6, 95% CI 1.1 to 6.3, p = 0.03).

**DISCUSSION**

Registry data are available from a number of other published series, however most have significant limitations and some are limited to specific clinical scenarios or trial exclusion

### Table 1 Complications at one month follow up

<table>
<thead>
<tr>
<th>Patients (n = 3071)</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Death</strong></td>
<td>49 (1.6%) 1.2% to 2.1%</td>
</tr>
<tr>
<td><strong>Myocardial infarction</strong></td>
<td>38 (1.2%) 0.9% to 1.7%</td>
</tr>
<tr>
<td><strong>Revascularisation</strong></td>
<td>39 (1.3%) 0.9% to 1.7%</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td>10 (0.3%) 0.2% to 0.6%</td>
</tr>
<tr>
<td><strong>Puncture site complications</strong></td>
<td>68 (2.2%) 1.7% to 2.8%</td>
</tr>
<tr>
<td><strong>Death/Q-MI/Revascularisation</strong></td>
<td>91 (3.0%) 2.4% to 3.6%</td>
</tr>
</tbody>
</table>

*With Q wave: 20 (0.7%).
cohnets. The National Heart Lung and Blood Institute (NHLBI) registries are relatively small as a proportion of national activity, and cases are consecutive for specified operators, rather than by centre.² ³ The German Community Hospitals series from 1992–94 had 98% follow up, however this pre-dates widespread stenting, with a stent rate of only 2.8%.⁴ The European registry of cardiac catheter interventions from 1996 concerns activity rather than outcomes.⁵

The OPEN registry attempted to overcome these limitations by using a very large number of national centres, recruiting all patients, and having fully audited one month follow up. OPEN is less selective and more complete in its data collection than most other published series and it provides some of the most reliable and complete, representative outcome data available for contemporary PCI.

The OPEN registry gives an accurate image of PCI in a western country with a high stenting rate, and low IIb/IIIa inhibitor prescription. Major adverse cardiac events occur in roughly 3% of patients and are influenced by modifiable factors such as the number of implanted stents and the lack of β blocker prescription. Bleeding complications were clearly influenced by a prolonged prescription of heparin after the procedure.

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REFERENCES

IMAGES IN CARDIOLOGY

Aortic tornado

The figure shows cardiovascular magnetic resonance visualisation of flow through a patent ductus arteriosus (PDA). The study also showed evidence of a type of flow familiar at the outlet of a bath or in atmospheric storms, but which may not have been detected inside the body before: a converging, tornado-like vortex.

A 21 year old woman with a continuous murmur and pulmonary artery and left ventricular dilatation on echocardiography was imaged. An appropriately aligned cine acquisition showed a dark streak indicative of a jet from the PDA in the upper part of the pulmonary trunk (main panel). Surprisingly, however, a dark streak of signal loss also extended back from the duct into the aortic lumen during systole.

We had seen this phenomenon in a previous PDA patient and suspected the aortic signal loss was caused by gradients of velocity in the “eye” of a converging vortex. In the current patient, therefore, we performed phase contrast velocity mapping, encoded head-to-foot, in a plane transecting the presumed vortex, as indicated by the dotted line. The velocity map showed rotation or vorticity of flow in the aorta, clockwise as viewed from the front (inset). The highest velocities in this plane were close to the centre of rotation.

Our interpretation is that the vortex develops as flow converges on the duct from blood that has already gained rotational momentum after passing through curvatures of the arch. The rotating flow spins faster as it is drawn into the eye of the vortex towards the PDA.

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