SCIENTIFIC LETTER

Same day discharge following elective percutaneous coronary intervention in patients with stable angina

A P Banning, O J M Ormerod, K Channon, C J McKenna, W Orr, B Boulton, Y Bashir, J C Forfar

Heart 2003;89:665–666

With current stent technology and potent antiplatelet drugs, the results of percutaneous coronary intervention (PCI) are increasingly predictable. Kiemennej and colleagues¹ first described PCI as a daycase procedure done via the radial artery, though nearly 50% of these patients were considered unsuitable for same day discharge post-procedure. Subsequently, Koch and colleagues² performed PCI on > 1000 patients via the femoral artery, transferring more than 90% the same day, back to their referring non-interventional hospital for overnight observation.

In the UK, pressure on elective beds causes procedure cancellations and long waiting lists. Performing PCI as a day case procedure minimises the problems of bed availability and reduces overall cost. In 1999 we initiated a policy of elective PCI using coronary stenting and femoral artery access with same day discharge from hospital. During a two year period, 487 patients underwent day case PCI and we report on their immediate and six month outcomes.

METHODS

Between 1 February 1999 and 1 February 2001, our institution performed 1664 PCI procedures. A total of 487 patients with stable angina were admitted electively for PCI with planned same day discharge. Cases not considered for day case procedures included patients with acute coronary syndromes, patients with adverse angiographic appearances including bifurcations, small vessels (< 3 mm), diffuse disease, and lesions unsuitable for stenting. Cases where glycoprotein IIb/IIIa inhibitors were to be used electively were also excluded, as were patients with symptomatic heart failure and patients who for social reasons were unsuitable for same day discharge. Patients attended the hospital for 2–3 hours in the week before the procedure for routine blood tests and pre-clerking. Most patients were pre-loaded at home on the evening before the procedure with clopidogrel 300 mg, but some patients underwent day case PCI immediately following the diagnostic catheter procedure. These patients were already on aspirin and they received clopidogrel 300 mg orally immediately after PCI.

6 French catheters were used via the femoral artery with weight adjusted heparin (70 U/kg). Stents were sized to a ratio of 1.1:1.0, and deployed at 8–16 atmospheres. Post-procedural heparin was not used. Line removal was routinely performed with manual pressure followed by ambulation two hours later. Cases were scheduled to take place before midday and discharge from hospital was > 6 hours following return from the catheter laboratory. The maximum duration of the in-patient stay was 12 hours. Routine treatment on discharge included long term aspirin and clopidogrel for at least four weeks.

Patient demographics and procedural variables including number and lesion location, number of stents used, use of glycoprotein IIb/IIIa inhibitors, and procedural outcome were recorded in the catheter laboratory database. The incidence of bleeding and other in-hospital complications was documented

Table 1 Procedural outcomes

	n	%
Admitted for day case PCI	487	
Same day discharge	409	84
Multivessel PCI	40	8
Vein graft PCI	16	3
Major haematoma	10	2
Readmission within 72 hours	0	0
Emergency CABG	0	0
Procedural MI on ECG criteria	3	0.6
In-hospital death	0	0

CABG, coronary artery bypass grafting; MI, myocardial infarction; PCI, percutaneous coronary intervention.

before discharge. Routine sampling of cardiac enzymes before discharge was not performed.

Patients were followed up locally or by referring district cardiologist and a postal questionnaire was sent to general practitioners six months after PCI. Information obtained at follow up included current symptomatic status, need for readmission and rates of target lesion revascularisation, stent thrombosis, and the major adverse cardiac events (MACE)—that is, myocardial infarction, the need for repeat revascularisation, coronary artery bypass grafting (CABG) or death.

RESULTS

The mean (SD) age of the 487 patients electively admitted for day case PCI was 61 (8.9) years. One hundred and eleven (23%) were female, 39 were current smokers (8%), 297 (61%) had a history of hypertension, and 32 (7%) were diabetic. Procedural details are given in table 1. Five hundred and fifty three vessels (1.09 per patient) were treated using 542 stents (1.1 per patient mean (SD) size 3.5 (0.4) mm). Fifteen patients (3%) underwent balloon inflation alone; 10 for in-stent restenosis and five optimal results with balloon only in small vessels (< 2.5 mm).

Four hundred and forty four out of 487 (90%) patients had their lines removed with manual pressure, with device closure being used only in patients with poorly controlled blood pressure or increased bleeding risk. Periprocedural myocardial infarction (on ECG criteria) occurred in three patients, all admitted to hospital (0.6%). No readmissions, deaths, need for emergency CABG or haemorrhage requiring transfusion occurred in the 72 hours following same day PCI.

Same day discharge occurred in 409 patients (84%). Reasons for non-discharge included a suboptimal result requiring prolonged in hospital monitoring (n = 49, 10%), use

Abbreviations: CABG, coronary artery bypass grafting; MACE, major adverse cardiac event; PCI, percutaneous coronary intervention

of abciximab ($n = 19$, 4%), and puncture site haematoma ($n = 10$, 2%). Minor haemorrhage (haematoma) occurred in 13 patients but this did not preclude hospital discharge. Sixty eight per cent of failed same day discharges were in the first half of the patient group, and the number of non-discharges fell for the whole patient group and per operator as the daycase programme progressed. High patient satisfaction scores¹ (score ranges from 0–36) indicated that daycase PCI was popular with the patients ($n = 100$, sample range 28–36, mean and median 34, standard deviation 2).

The response rate to the follow up questionnaire sent to the primary care physicians was 381/487 (78%). At a mean of six months, the reported overall MACE rate was 9.7%: repeat PCI 5%; CABG 3.2%; myocardial infarction 1%; death 0.5% (two patients).

DISCUSSION

This study suggests that in selected patients, elective daycase PCI is both feasible and safe. Procedures were performed using reduced dose heparin, clopidogrel, and early line removal and mobilisation.

Although the majority of our patients were discharged on the same day as the procedure, some patients required hospital admission. An element of unpredictability persists during PCI and cases will require admission because of failure to achieve an optimal result or unpredictable complications. Therefore, availability of beds for patients unable to be discharged is a prerequisite of any day case PCI programme.

Considerable debate persists about the role of IIb/IIIa inhibitors in patients with stable angina.⁴ When calculating the additional procedural risk of undertaking the procedure without IIb/IIIa inhibitors, it is necessary to recognise that

there is a risk to the patient in the community while awaiting an in-patient bed. Our same day discharge policy has allowed PCI patients with stable angina to undergo treatment despite increasing waiting lists and cancellations caused by emergency bed pressures.

Our experience shows that there is a learning curve for operators undertaking day case PCI. In our unit case selection has evolved. Currently patients with chronic stable angina are selected for day case PCI if they are not diabetics, have a single or multiple discrete lesions in vessels > 3 mm in diameter, there are no significant bifurcations, and the lesions are not in vein grafts. We believe that same day discharge is safe, when an optimal angiographic result is achieved in low risk patients with discrete lesions.

Authors' affiliations

A P Banning, O J M Ormerod, K Channon, C J McKenna, W Orr, B Boulton, Y Bashir, J C Forfar, Department of Cardiology, John Radcliffe, Oxford, England,

Correspondence to: Dr Adrian Banning, Department of Cardiology, John Radcliffe Hospital, Oxford OX 3 9DU, UK; adrian.banning@orh.nhs.uk

Accepted 7 March 2003

REFERENCES

- 1 Kiemeneij F, Laarmann GJ, Slagboom T, *et al.* Outpatient coronary stent implantation. *J Am Coll Cardiol* 1997;**29**:323–7.
- 2 Koch KT, Piek JJ, Prins MH, *et al.* Triage of patients for short term observation after elective coronary angioplasty. *Heart* 2000;**83**:557–63.
- 3 Boulton B. Development and use of a tool for measuring patient satisfaction following PTCA performed as a day case procedure. MSc dissertation. Brooks University (available on request from the authors).
- 4 Knight CJ. National Institute for clinical excellence guidance: too NICE to glycoprotein IIb/IIIa inhibitors? *Heart* 2001;**85**:481–3.

IMAGES IN CARDIOLOGY

Valved conduit from the left ventricular apex to ascending aorta for recurrent congenital subaortic stenosis: 25 years later

Twenty five years ago, at the age of 9 years, the patient had a membranous subaortic obstruction resected, which recurred three years later, involving all quadrants of the left ventricular outflow tract. As a second transaortic resection was unlikely to be successful, a Hancock porcine valved pulmonary artery conduit was anastomosed from an apical left ventriculotomy to the ascending aorta, shown in the right hand panel with ventriculography taken in the straight 30° right anterior oblique projection. Four years later (age 16 years), severe porcine prosthetic incompetence developed because of cusp rupture and prolapse, a well known complication of conduit valve insertion in children. It was replaced by a pericardial valved pulmonary conduit, sewn end to end within the original conduit shown schematically here. The patient remained asymptomatic for 20 years, including two successful uncomplicated pregnancies. Investigation of recent onset dyspnoea, 25 years since the original conduit surgery, revealed a functionally intact

conduit with moderately severe native aortic regurgitation, moderate left ventricular dysfunction, and moderate pulmonary hypertension. A Konno procedure was performed to enlarge the aortic root and allow aortic valve replacement with an ATS mechanical valve. The conduit was removed completely and residual defects closed by primary repair. The postoperative period was complicated by persistent sepsis and refractory

elevated pulmonary vascular resistance, with consequent right heart failure. Despite support with a right ventricular assist device, inotropes, and broad spectrum antibiotics, the patient died 12 days postoperatively.

E Kotschet

J Federman

B Davis

ekotschet@hotmail.com