SCIENTIFIC LETTER

What is the incidence of myocardial necrosis in elective patients discharged on the same day following percutaneous coronary intervention?

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The safety and predictability of percutaneous coronary intervention (PCI) has improved dramatically in the last decade. The increased numbers of patients suitable for the procedures have placed pressure on existing health care systems. Treating patients with chronic stable angina on a day case basis without an overnight stay has several attractions,[1] but there are some concerns over the safety of this approach.

Troponin I is released rapidly following myocardial necrosis, it is highly sensitive, and may be more specific than other enzymatic markers of cardiac damage. Elevation of cardiac markers, mainly creatine kinase-MB, after both elective percutaneous and surgical revascularisation reflects myocardial necrosis and is associated with increased risk of in-hospital and long term adverse events.[2]

Glycoprotein (Gp) IIb/IIIa inhibitors appear to be particularly beneficial in reducing this complication,[3] but day case intervention precludes overnight administration of Gp IIb/IIIa inhibitors.

This audit determined the incidence of serum troponin I elevation after 6–8 hours in patients discharged the same day according to pre-specified clinical, angiographic, and procedural criteria.

METHODS

Two hundred and twenty nine consecutive patients were admitted for elective day case PCI from January to July 2002. This represents 30% of the total PCIs in our institution during this period (n = 762).

Predetermined clinical and angiographic inclusion and exclusion criteria were used. Patients had stable angina caused by focal disease and were undergoing elective PCI. Patients aged > 80 years, with unstable symptoms, peripheral vascular disease, insulin requiring diabetes, heart failure, creatinine > 200 mmol/l, or poor social circumstances were excluded. Angiographic exclusions included left main stem, bifurcation, long diffuse lesions, small vessels (< 3 mm), and vein graft disease. Patients were admitted overnight if a significant procedural complication occurred. Admission was also advised for arterial access site complications, persistent chest pain, ECG abnormality, or if the procedure was prolonged. A 6 French femoral approach was used with 300 mg clopidogrel pre-loading given up to three days before the procedure, prescribed at a pre-clerking visit. Heparin was used at either 5000 U or 70 IU/kg. Sheath removal was accomplished with manual compression once activated clotting time was < 200 seconds. A minority of obese and hypertensive patients had femoral artery closure devices with Angioseal (St Jude). Mobilisation was allowed after two hours. Patients were discharged after a minimum of six hours observation (range 6–10 hours). Blood for troponin I measurement was drawn just before discharge. Troponin concentrations were not available to the physician making the decision to discharge the patient from hospital.

Troponin I was measured using the Immulite troponin I solid phase chemiluminescent enzyme immunometric assay (Diagnostic Product Corporation, Los Angeles, California, USA). The upper cut off concentrations for normality suggested by the manufacturer were considered positive for the analysis (troponin I concentration ⩾ 1 μg/l).

RESULTS

The procedure was successful in 223 patients (97%). Six failures occurred: one broken catheter at aortic bifurcation, referred for surgery; and five failed attempts to reopen chronically occluded vessels, discharged same day. Stents were deployed in 91% of cases. Mean age was 64 years, 77% were male, and 14% were non-insulin dependent diabetic patients. Treated vessels were: left anterior descending coronary artery (LAD) in 125 patients (55%), circumflex coronary artery (Cx) in 48 patients (21%), and right coronary artery (RCA) in 56 patients (24%). A further 15% of patients had PCI on a second vessel. Mean stent length was 19.6 mm.

Abciximab was used in 22 patients (9.6%), when judged necessary by the operator. Five patients receiving abciximab were still discharged (the protocol used was a abciximab bolus with six hours infusion protocol and patients went home after a minimum of 12 hours observation).

One hundred and ninety six patients (86%) underwent same day discharge. These patients had a mean of 1.1 vessels treated with a mean stent length of 18 mm. The mean (SD) radiation dose for the procedure was 3487 (2696) Gy/cm^2. Troponin I was measured in 172 of 196 subjects. The incidence of enzyme elevation in same day discharge patients was 3% (5/172 patients ⩾ 1 μg/l; range 1.2–3.1 μg/l) Table 1 shows a detailed analysis of these five cases.

Thirty three patients (14%) were admitted to hospital: in 12 patients abciximab was administered; one patient had angiographic no reflow; 10 patients had residual dissection; one patient was aged > 80 years; three patients had side branch occlusion; one patient had elevated baseline creatinine; two patients had prolonged ECG changes; and three patients were admitted because of the judgement of the operator. Among the admitted patients, a mean of 1.3 vessels were treated with a mean stent length of 28 mm. The mean radiation dose for the procedure was 5308 (3018) Gy/cm^2 ($p < 0.001$ *v* non-admitted patients).

Abbreviations: Cx, circumflex coronary artery; LAD, left anterior descending coronary artery; RCA, right coronary artery; ISAR REACT, intracoronary stenting and antithrombotic regimen-rapid early action for coronary treatment

Table 1 Details of the five same day discharge patients with elevated troponin I concentrations at ⩾ 6 hours

	Troponin I concentration (µg/l)	Reason	Pre-procedural criteria satisfied	Same day discharge criteria satisfied
Patient 1	2.0	Single vessel PCI to LAD; total 16 mm stent	Yes	Yes
Patient 2	1.7	Planned stent to proximal LAD Additional long stent to diffusely diseased distal LAD Total 36 mm stent	Yes	No
Patient 3	1.2	Planned two vessel PCI 18 mm stent to left Cx. Cutting balloon to LAD in-stent restenosis and balloon to chronic total occlusion of distal LAD	No	No
Patient 4	3.1	Planned PCI to chronic total occlusion of RCA Complicated by hypotension treated with atropine. Two wall stents, total stent length 81 mm	No	No
Patient 5	1.6	Planned single vessel PCI for diffuse LAD disease Total stent length 45 mm	No	No

Cx, circumflex coronary artery; LAD, left anterior descending coronary artery; PCI, percutaneous coronary intervention; RCA, right coronary artery.

DISCUSSION

These data provide more support for use of a day case PCI strategy in selected low risk patients with stable, non-complex coronary artery disease. We have previously described the outcome of a larger day case patient population and documented good outcomes up to six months following the procedure.[1]

Previous work has demonstrated that the prognostic value of troponin I elevation is not different between six hour and 24 hour post-PCI samples.[4] Therefore patients with a normal six hour troponin I concentration are at low risk and can be safely discharged on the same day. There has been considerable debate about the role of Gp IIb/IIIa inhibition in low risk elective patients undergoing PCI. In this study, we have shown that evidence of procedural myocardial necrosis is rare in patients undergoing elective PCI when these clinical, angiographic, and procedural criteria are applied. Our data concurs with recent randomised data from the ISAR REACT study,[5] suggesting no benefit when Gp IIb/IIIa inhibitors were given to low risk patients pre-loaded with clopidogrel.

In this series only 5/196 patients were discharged with evidence of troponin I elevation and a review of these cases demonstrated that four out of five should not have been admitted for the procedure on a day case basis according to our pre-specified criteria. We feel that using these criteria, day case PCI can be used to treat the lowest risk patients; this minimises cost without compromising outcomes. It is essential however to recognise that PCI remains an unpredictable specialty and that admission for overnight care must be available for occasions when the procedural result is not optimal.

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