SCIENTIFIC LETTER

Predictors of mortality in patients with acute coronary syndrome undergoing percutaneous coronary intervention

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Acute coronary syndromes (ACS) are a major health problem and account for a large proportion of the total number of hospitalisations in the UK. The question as to whether and when revascularisation is indicated remains controversial and the choice of surgery or percutaneous coronary intervention (PCI) or continued medical treatment is often difficult. Such decisions are critically dependent on the clinician's ability to risk stratify patients at presentation and to calculate the risk of invasive treatments. Our study aimed at identifying those risk factors that predict an increased mortality following PCI for non-ST elevation ACS.

METHODS

This was a retrospective outcome analysis of 630 sequential patients undergoing urgent PCI over a two year period (January 1999 to December 2000). All patients had the procedure during the same admission for unstable angina pectoris, non-ST elevation myocardial infarction, or unstable post-infarct angina. The chosen risk factors for mortality analysis were age, sex, ethnic group, hypertension, diabetes, hypercholesterolaemia, renal impairment, smoking, family history of ischaemic heart disease, previous myocardial infarction, any serious comorbidity, obstructive airways disease, peripheral vascular disease, number of vessels diseased, left ventricular (LV) function, and partial revascularisation. Cardiac troponin T was not routinely measured at our institution during the study period. A univariate analysis was performed to examine which variables were associated with early (30 day), medium (six months), and late (one year) mortality. Those found to be significant were then entered into a multiple logistic regression (forward linear) model.

RESULTS

Univariate analysis showed age, hypercholesterolaemia, diabetes, impaired LV systolic function, multivessel disease, previous myocardial infarction, peripheral vascular disease, renal impairment, and partial revascularisation to affect one year mortality. Table 1 shows the results of multiple regression analysis for the key risk factors. Diabetes mellitus, impaired LV function, and peripheral vascular disease independently predicted death at one year. Partial revascularisation predicted death at six months and one year, whereas age > 65 predicted death at one, six, and 12 months.

The one year mortality for the whole series was 6.8% (43 of 630) with an expected increase with age especially in patients over 75. One year mortality was as follows in the various age groups: age < 55, 0.8% (1 of 118); age 55–64, 1.1% (2 of 174); age 65–74, 6.2% (12 of 193), and age > 75 19.3% (28 of 145).

DISCUSSION

Revascularisation is becoming the preferred treatment option for managing patients at high risk from non-ST elevation ACS. However, the potential benefit of either surgery or PCI has to be weighted against its potential risks. In addition, highlighting the potential risks of a given procedure for a given patient has become an important component of good clinical practice. Quoting risks of procedures from published clinical trials is not always valid, as "real life" patients are known to be different from clinical trial patients.

It is evident that age is the predominant risk factor for PCI in ACS. Age > 65 is the only independent variable significantly affecting 30 day mortality. One month mortality was 2.1% in those aged 65–75, whereas it rose to 12.4% in those aged > 75. It is difficult to find comparable data in published series, as the elderly are usually excluded from randomised studies. For example, the FRISC II (Fragmin and fast revascularisation during instability in coronary artery disease) trial, one of the landmark studies supporting an early invasive approach to the treatment of ACS, excluded patients aged > 75.[1]

Abbreviations: ACS, acute coronary syndromes; FRISC II, Fragmin and fast revascularisation during instability in coronary artery disease; LV, left ventricular; PCI, percutaneous coronary intervention; PRAIS-UK, prospective registry of acute ischaemic syndromes in the UK; RITA 3, randomised intervention trial of unstable angina

Table 1 Results of multivariate analysis for predictors of 30 day, 6 month, and 1 year death following percutaneous coronary intervention for non-ST elevation acute coronary syndromes

	30 day mortality		6 month mortality		1 year mortality	
Variable	OR (CI)	p Value	OR (CI)	p Value	OR (CI)	p Value
Age >65 years	18.9 (5.5 to 64.5)	<0.001	6.8 (3.0 to 15.0)	<0.001	8.0 (3.8 to 17.1)	<0.001
Partial revascularisation		NS	3.6 (1.8 to 9.7)	0.01	3.1 (1.2 to 7.8)	0.02
Diabetes mellitus		NS		NS	2.7 (1.2 to 6.3)	0.02
LVEF <50%		NS		NS	2.3 (1.0 to 5.4)	0.05
Peripheral vascular disease		NS		NS	3.1 (1.0 to 9.4)	0.05

CI, confidence interval; LVEF, left ventricular ejection fraction; NS, not significant; OR, odds ratio.

Partial revascularisation was a predictor of mortality at six months and one year. This raises the commonly debated issue of the "culprit only" strategy. This strategy is acceptable and indeed unavoidable where complete revascularisation by PCI or bypass surgery is perceived to be too high risk. It may be that the optimal strategy for these patients is "culprit" plus complete revascularisation at a later stage to avoid medium or longer term adverse cardiac events. The fact that some of these patients are rendered asymptomatic by early partial revascularisation does make it difficult to insist on further procedures. This is an obvious area for a full randomised clinical trial.

The finding that poor systolic function, peripheral vascular disease, and diabetes were associated with adverse prognosis following PCI is in agreement with previous large studies of risk factor analysis in all PCI.[2] These risk factors, and especially age, are known to be predictors of adverse prognosis in patients presenting with ACS irrespective of treatment strategy.[3]

This study need not necessarily discourage physicians from opting for an invasive revascularisation procedure for those high risk patients presenting with ACS including those who are older than 75. PRAIS-UK (prospective registry of acute ischaemic syndromes in the UK) highlighted the poor prognosis of this condition especially in those > 70 years old.[4] The revascularisation rate in this ongoing registry was very low with only 4% undergoing inpatient PCI and even fewer having bypass surgery. The six month total cohort mortality in our series of 5.4% compares favourably with the PRAIS-UK six month mortality of 7.4% despite our higher 30 day mortality as one would expect from an invasive treatment group. Interestingly, the recent RITA 3 (randomised intervention trial of unstable angina) showed that there is no mortality benefit when moderate risk patients with unstable angina are treated with an invasive strategy.[5] However, RITA 3 patients had lower risk than our patient subset.

Our study highlights that when patients with non-ST segment elevation ACS are about to undergo PCI they should be individually assessed for procedural risk, as well as for medium term prognosis, taking into account their age, systolic LV function, and the presence of diabetes mellitus and peripheral vascular disease. With the continuous evolution of coronary intervention complete revascularisation, whether in one or in a staged setting by PCI or delayed bypass surgery, should be the desired goal to avoid the long term risks of partial revascularisation.

Older patients do have an acceptable procedural risk but their medium term mortality is much higher than in the younger patients. Is it their disease and comorbidity? Does PCI, despite the risks, improve the natural history? The answers can only come with a properly planned trial that includes patients older than 75 years.

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