SWIFT trial of delayed elective intervention *v* conservative treatment after thrombolysis with anistreplase in acute myocardial infarction

SWIFT (Should We Intervene Following Thrombolysis?) Trial Study Group

Abstract

***Objective*—To see whether early elective angiography with a view to coronary angioplasty or bypass grafting of a stenosed infarct related vessel would improve outcome in acute myocardial infarction treated by thrombolysis with anistreplase.**

***Design*—Randomised study of two treatment strategies with analysis of results over 12 months.**

***Setting*—21 district hospitals and regional cardiac centres in Britain and Ireland.**

***Subjects*—800 of 993 patients presenting with clinical and electrocardiographic features of acute myocardial infarction up to three hours after the onset of major symptoms.**

***Treatment strategies*—Intravenous anistreplase 30 units followed by a standard regimen of heparin, warfarin, and timolol and (in patients so randomised) early angiography plus appropriate intervention.**

***Main outcome measure*—Death or reinfarction within 12 months.**

***Results*—397 patients were randomised to receive early angiography plus appropriate intervention (coronary angioplasty in 169 cases, coronary grafting in 59) and 403 patients to receive conservative care (of these, 12 had angioplasty and seven bypass grafting during the initial admission). By 12 months mortality (5·8% (23 patients) in the intervention group *v* 5·0% (20) in the conservative care group; p=0·6) and rates of reinfarction (15·1% (60 patients) *v* 12·9% (52); p=0·4) were similar in the two groups. No significant differences in rates of angina or rest pain were found at 12 months. Left ventricular ejection fraction at three and 12 months was the same in both groups. Median hospital stay was longer in the intervention group (11 days *v* 10 days; p<0·0001).**

***Conclusion*—For most patients given thrombolytic treatment for acute myocardial infarction a strategy of angiography and intervention is appropriate only when required for clinical indications.**

Introduction

Large scale trials using mortality as the end point have consistently shown that in patients with acute myocardial infarction important reductions in mortality can be achieved by early intravenous thrombolytic treatment followed by simple anticoagulant or platelet antiaggregatory regimens.[1-3] Angiography regularly shows residual coronary stenosis in about 70% of vessels made patent by thrombolysis.[4,5] It has been suggested that survival might be further improved and the risk of reinfarction diminished by electively dilating such residual stenoses by percutaneous coronary angioplasty. The anistreplase intervention mortality study showed a mortality reduction from 12% to 6% at 30 days in patients with acute myocardial infarction treated with a single intravenous injection of anistreplase 30 units followed by heparin and warfarin compared with patients treated with heparin and warfarin alone.[2] The SWIFT (should we intervene following thrombolysis?) trial was set up to compare outcome and side effects in patients with myocardial infarction treated with anistreplase according to the regimen used in the anistreplase intervention mortality study and then randomised to a policy of conservative management or to elective angiography with a view to coronary angioplasty or coronary bypass grafting. It was recognised that detecting a further mortality reduction would require a very large trial, and therefore a combined end point of death and reinfarction at one year was chosen as the principal outcome measure. Other outcome measures were angina, left ventricular ejection fraction, and length of hospital stay.

Patients and methods

Entry and exclusion criteria—Criteria for entry to the trial were age <70, clinical features of a first myocardial infarction, symptom duration three hours or less from the onset of major symptoms to the time of drug administration, and electrocardiographic evidence of acute myocardial injury in the form of ST elevation of >0·1 mV in two or more standard leads or >0·2 mV in two or more precordial leads. Exclusion criteria were cardiogenic shock (systolic blood pressure <80 mm Hg), history of a haemorrhagic diathesis or recent bleeding, active peptic ulceration within one year, cerebrovascular accident within three months, surgery or major trauma (including head injury) within three months, previous streptokinase or anistreplase treatment within six months, hypertension >200/120 mm Hg, prolonged external cardiac massage, menstruation or the possibility of pregnancy, diabetic proliferative retinopathy, radiological evidence of pulmonary oedema, life expectancy less than two years owing to intercurrent disease, or a perceived need for immediate surgical intervention.

Consent—All patients were required to give consent in a form acceptable to local ethical committees. Frequently consent was obtained in two stages—initial consent to receive a thrombolytic agent, followed by more detailed explanation of the implications of randomisation when the patient was pain free and stable.

Drug administration—Anistreplase 30 units was given as a slow intravenous injection over five minutes immediately after entry and exclusion criteria had been verified and consent secured. Heparin 1000 units hourly by continuous intravenous infusion was started four to six hours later and the dose adjusted to give an approximate doubling of the activated partial thromboplastin time or thrombin coagulation time. Oral anticoagulation with warfarin could be started at

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Members of the steering committee and centres that participated in the study are listed at the end of this report

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the clinician's discretion and heparin discontinued once the prothrombin time (international normalised ratio) was greater than 2·0. All patients without contraindications were to start treatment with an oral β adrenoceptor antagonist, preferably timolol 10 mg twice daily, before discharge. All other medication, including the use of aspirin, was at the clinician's discretion.

Randomisation—Patients were randomised within 24 hours of receiving anistreplase by telephoning a dedicated randomisation centre (Royal Sussex County Hospital, Brighton). After registering the patient randomisation centre staff opened a sealed envelope bearing the name of the investigating centre and informed the investigator whether the patient was to be allocated to a strategy of early coronary angiography with a view to intervention by angioplasty or coronary artery grafting or to a strategy of angiography and intervention only if required for conventional clinical indications. Randomisation was balanced within centres. Reasons for non-randomisation of other patients receiving anistreplase were recorded and the patients followed up for mortality and reinfarction within 12 months.

Coronary arteriography—Coronary arteriography was to be performed within 48 hours of randomisation. The technique used was at the operator's discretion. Left ventricular cineangiography was not required. The decision to intervene after angiography was at the clinician's discretion, but the following guidelines were provided: (*a*) angioplasty is the preferred mode of treatment; (*b*) the index or culprit segment is the primary target; (*c*) the prime indication for intervention is "any antegrade flow through a main target artery judged still to be compromised by a narrowed segment"; (*d*) the degree of narrowing which indicates vulnerability is a diameter stenosis >50%; (*e*) attempted recanalisation of an occluded vessel is not required; (*f*) coronary bypass grafting is allowed if angioplasty is not feasible or unlikely to be successful, if multiple lesions are present, or if angioplasty is unsuccessful. All coronary arteriograms were reported locally using perfusion scores defined by the TIMI (thrombolysis in myocardial infarction) study group.[6]

Coronary angioplasty—The technique of angioplasty and use of additional medication around the time of angioplasty were at the operator's discretion. Coronary arteriography was repeated after angioplasty, with at least two views of the treated segment(s).

Management of patients in conventional care group—Patients in the conventional care group were managed according to the investigator's usual protocol for patients with myocardial infarction. Routine coronary angiography was not permitted, but angiography was allowed for persisting or recurrent chest pain, for postinfarction angina, or after a positive exercise test result.

Follow up and radionuclide ventriculography—The protocol specified follow up including clinical assessment for reinfarction and angina at three, six, and 12 months after randomisation. Gated blood pool radionuclide ventriculography to determine left ventricular ejection fraction was performed in 15 of the participating centres two to three months after trial entry and again at 12 months. The technique used was that in routine use at the centres concerned.

Size of trial and recruitment—The proposed trial size was set at 800 patients. With an expected rate of 25% for the combined end point of death or reinfarction, or both, in the conventional care group within one year a true reduction of one third could be detected with over 80% power with (two sided) type I error=0·05. No interim analyses of the data were planned or conducted. The trial was undertaken in 21 centres in the United Kingdom and the Republic of Ireland. Patients were recruited between June 1986 and November 1988.

Statistical methods—Categorical variables were compared by the χ^2 test or, when event numbers were small, Fisher's exact test. Odds ratios and 95% confidence intervals were also calculated. Radionuclide ejection fractions were compared by analysis of variance, survival curves by the log rank test, and lengths of hospital stay by the Mann-Whitney (Wilcoxon) test.

Results

Eight hundred patients entered the study and were randomised. A further 193 patients received anistreplase but were regarded as non-randomised. These patients included 33 in one centre who were randomised but subsequently excluded because of an important misunderstanding of the protocol (angiography performed in all patients irrespective of randomisation). Table I shows the reasons for non-randomisation. In 92 cases (48%) the sole reason was that informed consent to an interventional or conservative policy was not given.

TABLE I—*Reasons for non-randomisation in patients given anistreplase*

	No of patients
Death (with or without cardiogenic shock or pulmonary oedema)	14
Cardiogenic shock	6
Pulmonary oedema	17
Other medical circumstances	30
Informed consent not given	92
Protocol violations	33
No patient record available	1
Total	193

Of the 800 patients who were randomised, 397 were allocated to receive early angiography plus appropriate intervention (intervention group) and 403 to receive conservative management (conventional care group). A total of 784 patients (98%) received anistreplase within three hours of the onset of major symptoms of infarction (all 800 within three and a half hours), and the intervals between onset of symptoms and treatment were similar in the intervention and conventional care groups. The two groups were also well matched for baseline characteristics (table II). Baseline characteristics of non-randomised patients were similar apart from a higher proportion with hypertension (22% *v* 16% in the other two groups).

TABLE II—*Baseline characteristics of intervention, conventional care, and non-randomised patient groups*

	Conventional care group (n=403)	Intervention group (n=397)	Non-randomised group (n=193)
Mean age (SD) (years)	55·0 (8·5)	55·9 (8·4)	56·1 (8·7)
No (%) male	335 (83)	327 (82)	150 (78)
No (%) with previous angina	134 (33)	117 (29)	59 (31)
No (%) with hypertension	65 (16)	64 (16)	43 (22)
No (%) with claudication	12 (3)	12 (3)	2 (1)
No (%) current smokers	247 (61)	238 (60)	124 (64)
Mean diastolic blood pressure (SD) (mm Hg)	83·8 (15·3)	83·3 (14·1)	81·8 (15·8)
Mean systolic blood pressure (SD) (mm Hg)	133·9 (24·3)	132·6 (23·4)	130·3 (25·3)
Mean heart rate (SD) (beats/min)	76·0 (15·8)	76·2 (17·2)	77·1 (17·3)

A total of 377 patients (95%) randomised to intervention had angiography. In 260 cases (69%) this was accomplished by the second day and in 369 (98%) by the seventh day after thrombolysis. Angiography was also performed for clinical indications in 54 patients (13%) randomised to conventional care. In 32 of these patients angiography was for recurrent chest pain.

Other reasons included ventricular septal defect, cardiac failure, and persistent arrhythmia. In this group only 11 angiograms were obtained within the first two days and 32 within seven days (fig 1).

Among the patients randomised to intervention the presumed infarct related segment (identified on the basis of angiographic and electrocardiographic data) was in the right coronary artery in 190 cases (48%), left anterior descending artery in 155 cases (39%), and left circumflex coronary artery in 52 cases (13%). There was a similar distribution in those patients in the conventional care group who had angiograms. Thirty eight (10%) of the patients in the intervention group who had angiography did not have stenosis >50% of the coronary artery diameter; of the others, 177 (47%) had single vessel, 102 (27%) two vessel, and 60 (16%) three vessel disease, a diameter stenosis of >50% anywhere in the vessel being taken as a criterion. At the time of angiography 255 patients (68%) in the intervention group had a patent infarct related vessel according to the TIMI criteria (grades 2 and 3).[6]

One hundred and sixty nine patients in the intervention group (43%) had coronary angioplasty and 59 (15%) coronary bypass grafting during the initial hospital admission. The remaining 169 patients had no intervention (fig 2). Twelve patients (3%) in the conventional care group had coronary angioplasty and seven (2%) coronary bypass grafting during the initial admission. By the operator's own assessment the primary success rate for angioplasty in the intervention group was 87% (147 cases), irrespective of whether the infarct related segment was patent (136 cases) or occluded (33). The angioplasty related complication rate (further pain or postangioplasty reocclusion) was 10% (14 cases) for patients with a patent vessel and 15% (five cases) for an occluded vessel.

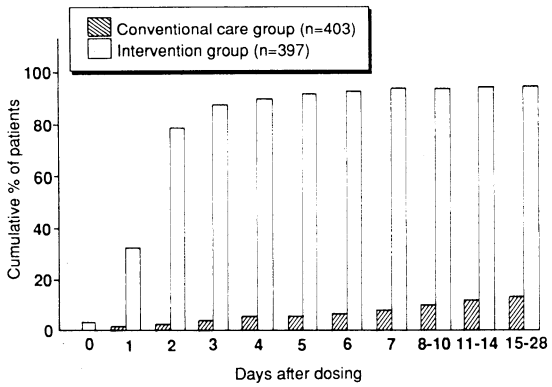

FIG 1—*Timing of angiography and interventions in conventional care and intervention groups*

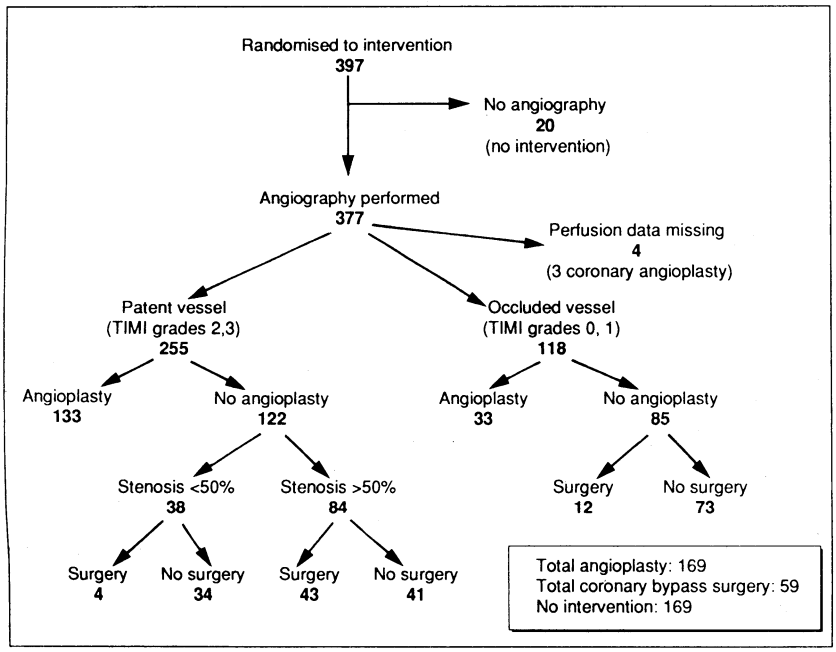

FIG 2—*Nature of interventions in group randomised to coronary angiography. (TIMI grades as defined in thrombolysis in myocardial infarction trial*[6])

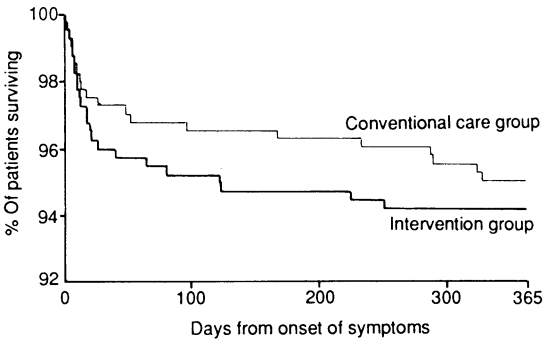

FIG 3—*One year survival curves for patients randomised to conventional care or intervention*

The median length of hospital stay was 11 days (interquartile range 10 to 15) in the intervention group and 10 days (interquartile range 8 to 12) in patients randomised to conventional care. The difference between the distributions was significant ($p<0.0001$). One hundred and eight patients (27%) in the intervention group were in hospital for more than 14 days compared with 58 patients (14%) in the conventional care group. The median length of stay of non-randomised patients was nine days (interquartile range 6 to 13), which was similar to that in the conventional care group.

Interventions between initial hospital discharge and the planned 12 month follow up were more frequent in the conventional care group than in the intervention group. This applied to diagnostic angiography (intervention group 20 patients, conventional care group 57; $p<0.001$), angioplasty (intervention group four patients, conventional care group 16; $p=0.011$), and coronary bypass grafting (intervention group 10 patients, conventional care group 24; $p=0.022$).

Survival data to 365 days were available for 374 patients (94%) in the intervention group and 369 patients (92%) in the conventional care group. Some patients anticipated the 12 month follow up visit, and survival data to 11 months were available for 390 patients in the intervention group (98%) and 393 patients in the conventional care group (98%). One hundred and eighty four non-randomised patients (95%) were followed up for 365 days.

There were 11 deaths in hospital in the conventional care group (2·7%) and 13 in the intervention group (3·3%). Three patients in the intervention group died of causes related to the intervention. One patient had a cardiac arrest during angioplasty from which he could not be resuscitated, and another died 18 hours after angioplasty to the right coronary artery, during which reocclusion occurred as a result of intimal dissection. The remaining patient died during coronary bypass grafting. Twenty five patients (13%) in the non-randomised group died in hospital, 18 within 24 hours of admission, three within 72 hours, and the remainder within four weeks. Overall mortality in hospital irrespective of randomisation or treatment group was 4·9%. The 12 month mortality was 5·8% (23 patients) in the intervention group and 5·0% (20 patients) in the conventional care group (odds ratio 1·18 (95% confidence interval 0·64 to 2·10); $p=0.64$). Twenty of the 23 deaths in the intervention group and 14 of the 20 deaths in the conventional care group were ascribed to cardiac causes. Figure 3 shows the 12 month survival curves.

Forty eight patients in the intervention group

(12·1%) and 33 patients in the conventional care group (8·2%) suffered reinfarction before hospital discharge. Complete follow up data on reinfarction for 12 months were available for 320 patients (81%) in the intervention group and 326 patients (81%) in the conventional care group. In 752 patients (94%) follow up was complete to 11 months. Sixty patients in the intervention group (15·1%) and 52 in the conventional care group (12·9%) had suffered reinfarction (odds ratio 1·16 (95% confidence interval 0·77 to 1·75); p=0·42). Death or reinfarction within 12 months occurred in 76 patients in the intervention group (19·1%) and 67 patients in the conventional care group (16·6%) (odds ratio 1·19 (95% confidence interval 0·83 to 1·71)). Figure 4 shows the proportions of patients surviving without reinfarction up to one year after the onset of major symptoms. The difference between the curves was not significant (p=0·32, log rank test).

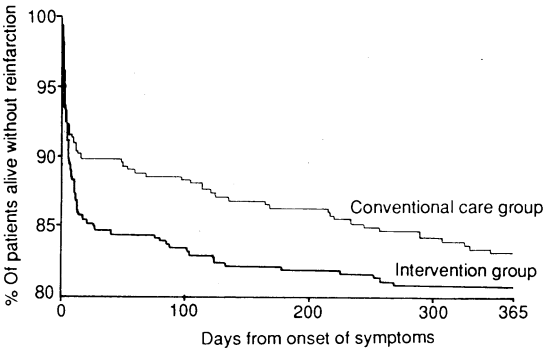

FIG 4—*Proportions of patients surviving free of reinfarction against time after onset of major symptoms*

Table III gives the data on angina and rest pain. There was a trend towards a higher prevalence of angina and rest pain in the conventional care group.

TABLE III—*Frequency of angina and rest pain at three, six, and 12 months of follow up*

		No (%) of patients in conventional care group	No (%) of patients in intervention group	Odds ratio (95% confidence interval)
3 Months	Angina	90/372 (24·2)	64/355 (18·0)	0·69 (0·48 to 0·99)
	Rest pain	37/372 (9·9)	28/358 (7·8)	0·77 (0·46 to 1·28)
6 Months	Angina	78/365 (21·4)	61/358 (17·0)	0·76 (0·52 to 1·10)
	Rest pain	26/363 (7·2)	17/359 (4·7)	0·64 (0·34 to 1·20)
12 Months	Angina	92/365 (25·2)	69/357 (19·3)	0·71 (0·50 to 1·01)
	Rest pain	23/366 (6·3)	12/358 (3·4)	0·52 (0·25 to 1·06)

Ejection fraction measurements at two to three months were available for 523 patients (86% of patients still alive in centres undertaking measurements). The mean ejection fraction was 50·7% (SD 14·8%) in the intervention group and 51·7% (SD 15·4%) in the conventional care group. Ejection fraction measurements at 12 months were available for 492 patients (82% of patients still alive in centres undertaking measurements). Mean ejection fraction was 51·7% (SD 14·2%) in the intervention group and 51% (SD 14·7%) in the conventional care group. There were large differences in pooled ejection fraction measurements among centres, presumably reflecting differences in equipment and technique. Analysis of variance was therefore used to test the significance of between group differences after adjusting for between centre differences. The findings showed no significant difference between treatment groups at two to three months or at 12 months.

Table IV lists the bleeding complications during the initial hospital admission. The incidence of major bleeding complications in both conventional care and intervention groups was low, with an overall incidence

TABLE IV—*Bleeding complications during initial hospital admission. Figures are numbers of patients*

	Conventional care group (n=403)	Intervention group (n=397)	Non-randomised group (n=193)
Cerebral bleeds	2	0	2
Gastrointestinal bleeds	6	5	8
Haematuria (including microscopic)	17	18	3
Bleeding from puncture site	26	35	12
Other	23	33	14
Total No (%) of patients with haemorrhagic events*	65 (16·1)	79 (19·9)	33 (17·1)

*Some patients had more than one event.

of cerebral bleeding of 0·4% and gastrointestinal bleeding of 1·9%. More patients in the intervention group had bleeding complications, but the difference did not reach significance (odds ratio 1·29 (95% confidence interval 0·90 to 1·86)). There was no evidence that possible benefits of early intervention were being negated by bleeding complications. In addition to the four episodes of cerebral haemorrhage during hospital admission (two in the conventional care group, two in non-randomised patients), seven cerebrovascular accidents occurred between initial hospital discharge and the one year follow up (five in the conventional care group, two in non-randomised patients). Three of these were transient ischaemic events and one occurred 24 hours after cardiac surgery. No cerebrovascular accident occurred in the intervention group.

Discussion

Previous trials of angioplasty after thrombolysis may be divided into those in which angioplasty was performed as soon as possible after thrombolysis[7-10] and those in which intervention was delayed.[6] Two early studies[7,8] suggested that immediate elective angioplasty after streptokinase thrombolysis might improve clinical outcome, but these results were not confirmed in larger trials of immediate or delayed angioplasty using alteplase as the thrombolytic agent.[6,9,10] The TAMI study (thrombolysis and angioplasty in myocardial infarction) comparing immediate and delayed angioplasty after alteplase also showed no difference in ultimate outcome.[11]

Most patients with acute myocardial infarction present to hospitals which do not have immediate access to coronary arteriography. It should be possible, however, to transfer patients for this investigation within 24-48 hours. The SWIFT trial design differed from immediate intervention studies such as the European cooperative study group trial[9] and the TIMI phase IIA trial[10] but closely resembled the TIMI phase IIB trial,[6] which used alteplase as the thrombolytic agent.

Death and reinfarction—There was no significant difference between the intervention and conventional care groups in survival free of reinfarction at one year. The failure of elective angioplasty to influence reinfarction rates could be due either to the intrinsic complication rate of angioplasty or to a lack of association between residual stenosis and risk of reinfarction. The reinfarction free survival curves (fig 4) might provide some support for the first hypothesis, in that the distance between the curves was maximal at 90 days and the lines then seemed to converge. This interpretation, however, must be regarded with great caution because of the small numbers of events and the possible effects of incomplete follow up. In this study the primary angioplasty success rate was 87% (147/169 cases) and the angioplasty related complication rate 10% (14/136 cases) in patients with open and 15%

(5/33) in those with closed vessels. The success rate was similar to reported rates for angioplasty in chronic stable angina.[12] The complication rate reflects the problems inherent in performing angioplasty in the presence of an unstable intimal flap and residual thrombus.[13] We emphasised that the SWIFT study was a comparison between the strategies of elective angiography with a view to intervention and angiography only for clinical indications. The overall intervention rate in those patients randomised to intervention who had angiography was 60% (228/377), which was lower than that in the European cooperative study group trial[9] but similar to that in the TIMI phase IIB trial.[6] Patients who had a patent but stenosed vessel but did not undergo intervention (41/377, 10·9%) were largely those with stenoses in small vessels or at peripheral sites.

Possible role of heparin and aspirin—The SWIFT protocol did not specify aspirin, and few patients received aspirin in the period immediately after thrombolysis. We can only speculate on its possible impact in the light of the findings of the second international study of infarct survival,[3] which were published after the SWIFT study started. All patients, however, received heparin, which is of comparable efficacy to aspirin in preventing subsequent infarction in patients with unstable angina,[14] and over 90% of patients having angioplasty received aspirin before this intervention. The clinical reinfarction rate in this trial was high as compared with some other studies,[1-3 15] but it was a specific feature of the design to select a group of patients in whom reinfarction would readily be detected—that is, patients with major electrocardiographic changes and a short delay between onset of major symptoms and treatment. Early studies showed a relation between the severity of residual stenosis and risk of angiographic reocclusion (often clinically silent),[16] but there has been little evidence from later studies that the severity of a residual stenosis correlates well with late clinical reinfarction. It is now usual to perform angiography on patients with recurrent or persistent ischaemia, so that patients with a severe stenosis in a vessel supplying a substantial area of viable myocardium tend to be selected out from clinical trials. The intervention rate in the conventional care group in this study, however, was considerably lower than in the TIMI phase IIB trial.

Angina—There was no significant difference in the frequency of angina or rest pain between the intervention and conventional care groups at 12 months, but patients in the conventional care group were more likely to have had angiography, angioplasty, or bypass grafting after initial hospital discharge.

Effect on left ventricular function—No support was provided for the hypothesis that relief of a residual coronary stenosis would improve left ventricular function by facilitating recovery from myocardial stunning. There are, however, two provisos—that (as mentioned above) several symptomatic patients in the conventional care group had angioplasty or bypass grafting performed and that the number of patients with a completely occluded vessel who underwent revascularisation was small.

Effect on length of hospital stay—Topol *et al* described a successful policy of early discharge in patients with myocardial infarction treated by thrombolysis followed by early angiography,[17] but it was not the aim of the SWIFT study to evaluate this possibility. The slightly longer hospital stay in the intervention arm probably reflected the logistic implications of transferring patients for angiography and of controlling warfarin anticoagulation after coronary angioplasty as well as the relatively prolonged stay of patients referred for bypass grafting. Conversely, the shorter initial hospital stay in the conventional care group was partly balanced by the increased admission rate for interventions after discharge.

Limitations of study—The overall mortality in both groups of patients randomised in the SWIFT study was low. Most deaths in hospital of myocardial infarction occur within the first 24 hours after admission, and these patients were excluded from randomisation by the protocol. This was reflected in the comparatively high mortality in hospital among the non-randomised patients. After allowing for this the overall mortality was similar to that reported in the anistreplase intervention mortality study.[2] We emphasise that the conclusions of this study cannot necessarily be applied to patients who did not fulfil the entry criteria, in particular those with recurrent infarction or cardiogenic shock.

Conclusion

Although there was no overall difference in reinfarction free survival at one year between patients randomised to elective intervention and those randomised to a pragmatic policy of conventional care with intervention only for clinical indications, the simplicity and cost advantages of the second policy suggest that it should at present be regarded as the more appropriate. Technical advances in angioplasty and in the use of antithrombotic agents continue and in due course will need to be tested in appropriate randomised trials.

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Data analysis was by M D Hughes and S J Pocock (London School of Hygiene and Tropical Medicine); D P de Bono (University of Leicester); and S H Wilkinson and M S Tydeman (SmithKline Beecham).

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Ethnic differences in mortality from ischaemic heart disease and cerebrovascular disease in England and Wales

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Abstract

***Objective*—To examine mortality from ischaemic heart disease and cerebrovascular disease in England and Wales by country of birth of the deceased.**

***Design*—Standardised mortality ratios were computed by country of birth groups for ischaemic heart disease and cerebrovascular disease for 1979-83 and 1970-2 by using the five year age-sex specific rates for England and Wales for 1979-83 as standard.**

***Setting*—England and Wales 1970-2 and 1979-83.**

***Results*—In 1979-83 mortality from ischaemic heart disease was highest in men and women born in the Indian subcontinent (standardised mortality ratio 136 and 146 respectively). Young Indian men suffered the greatest excess (313 at ages 20-29). Other groups with raised mortality included Irish, Scottish, and Polish born immigrants. Those born in the Caribbean, the old Commonwealth, west Europe, and the United States had low death rates. In England and Wales mortality from ischaemic heart disease declined by 5% in men and 1% in women between 1970-2 and 1979-83, with greatest percentage declines in immigrants born in the United States, South Africa, the old Commonwealth, the Caribbean, and France. Immigrant groups with raised mortality in the earlier period showed little improvement, and mortality from ischaemic heart disease increased among Indians (6% in men and 13% in women).**

In 1979-83 mortality from cerebrovascular disease was highest in Caribbeans (standardised mortality ratios 176 in men and 210 in women), followed by Africans, Indians, and Irish. Rates were low in west Europeans. Mortality from stroke declined by 28% overall in this period, a rate of decline shared by most groups. Men from the Indian subcontinent showed a decline of only 3%.

***Conclusion*—In the 1980s mortality from ischaemic heart disease and cerebrovascular disease differed significantly between ethnic groups in England and Wales. In general, ethnic groups that experienced lower mortality from ischaemic heart disease in the 1970s showed the greatest improvement over the following decade.**

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Introduction

Mortality attributable to circulatory diseases is known to vary between ethnic groups. In particular, a considerable excess of ischaemic heart disease among people of Indian extraction has been reported from several countries across the world.[1] Another consistent finding reported from Britain and elsewhere is the high incidence of hypertension among people of Afro-Caribbean descent.[2,3]

An analysis of cardiovascular mortality among immigrants in England and Wales was first published in 1984, based on national data from the 1971 census.[4] A further study examined the patterns of mortality among regional and religious groups originating from the Indian subcontinent, based on deaths in England and Wales during 1975-7.[5]

The findings presented here relate to mortality from ischaemic heart disease and cerebrovascular disease among immigrants in England and Wales during 1979-83, the latest years for which such national data are available. Comparisons are also made with mortality rates that prevailed in these groups in the preceding decade.

Methods

Mortality data for England and Wales for 1970-2 and 1979-83, classified by country of birth and centring on the 1971 and 1981 censuses respectively, were used for this analysis. Deaths were related to the corresponding populations as enumerated in the respective censuses.

Trends between 1970-2 and 1979-83 in mortality at ages 20-69 from ischaemic heart disease and cerebrovascular disease were examined for the different country of birth groups by calculating standardised mortality ratios for the two periods. The rates specific for age (five year age groups) and sex for ischaemic heart disease and cerebrovascular disease for England and Wales for 1979-83 were used as the standard in calculating the standardised mortality ratios for both periods to compare the changes across time and the country of birth groups. The percentage changes in the standardised mortality ratios for the two periods were tested for significance at the 5% level and 95% confidence intervals given for the 1979-83 standardised mortality ratios. Age specific ratios and standardised