Prognostic significance of left ventricular ejection fraction after acute myocardial infarction
A bedside radionuclide study

MICHAEL J KELLY, PETER L THOMPSON, MICHAEL F QUINLAN
From the Department of Cardiovascular Medicine and the Department of Nuclear Medicine, Queen Elizabeth II Medical Centre, Nedlands, Western Australia

SUMMARY  The prognostic significance of left ventricular ejection fraction measurements obtained at the bedside was assessed in 171 patients as soon as possible after acute myocardial infarction. Ejection fraction was measured with a radionuclide first pass portable probe method within a mean of 24 hours of the onset of major symptoms. The results were related prospectively to the subsequent incidence of ventricular fibrillation in hospital, and to hospital and postdischarge deaths in a mean follow up period of 15 (range 9–21) months. All eight episodes of primary ventricular fibrillation, all 12 deaths due to pump failure in hospital, and also 12 out of 13 postdischarge deaths occurred in that minority of 81 patients whose initial postinfarction left ventricular ejection fraction was <0.35. Multivariate correlation with clinical, enzymatic, and electrocardiographic indicators of myocardial infarction showed that the prognostic significance of these indicators could largely be explained by their association with low left ventricular ejection fractions. Left ventricular ejection fraction measured within the initial 24 hours after acute myocardial infarction predicts prognosis throughout the subsequent year.

Clinical studies have found that the prognosis after acute myocardial infarction depends mainly on the severity of clinical manifestations of left ventricular damage and dysfunction at the time of hospital admission.1–3 Direct angiographic measurements of left ventricular function in patients with ischaemic heart disease who are being investigated for possible coronary artery bypass surgery have shown that left ventricular ejection fraction measurements are of major prognostic importance.4,5 Nevertheless, the invasive nature of such measurements limits their application in patients with acute myocardial infarction. Minimally invasive first pass or equilibrium radionuclide methods for measuring ejection fraction directly from the relative decrease in left ventricular counts during systole6 correlate well with contrast angiography and are well suited to studies in such patients. Their relative independence of geometric assumptions concerning left ventricular shape makes them more desirable for studies in patients with acute myocardial infarction than other non-invasive techniques.7 The clinical application of such methods in this situation has therefore been advocated.8 Nevertheless, whether or not the expense of such measurements might be justified by their independent clinical and prognostic significance has not yet been determined.

We, therefore, carried out this study to define the prognostic significance of abnormal left ventricular ejection fractions at admission to a coronary care unit after acute myocardial infarction.

Patients and methods

During the 12 month study period all patients admitted to the coronary care unit with a diagnosis of suspected acute myocardial infarction within the preceding 72 hours were invited to enter the study. A bedside radionuclide measurement of left ventricular ejection fraction was then performed as soon as possible, after informed consent had been obtained.
Bedside ejection fraction and prognosis after infarction

Acute myocardial infarction was diagnosed when any two of the following were present: (a) a typical clinical history of acute myocardial infarction, (b) evolving electrocardiographic changes of acute Q wave or non-Q wave myocardial infarction, and (c) typical serum cardiac enzyme pattern of acute myocardial infarction based on creatine phosphokinase, serum aspartate aminotransferase, and lactate dehydrogenase activities; creatine phosphokinase isoenzymes were used when intramuscular injections had been given. In addition, postmortem confirmation of acute myocardial infarction was accepted.

This study included 171 patients with confirmed acute myocardial infarction (mean age 60 (9) (range 29–79) years), of whom 123 (72%) were male. These patients represented 91% of 188 patients with acute myocardial infarction admitted during the study period. The remaining 17 patients with acute myocardial infarction during this period were not studied either because of death within several hours of admission before study could be arranged (seven patients), inadequate venous access (four), an uninterpretable chest radiograph because of chest deformity (two), equipment malfunction (two), or consent withheld (two).

Left ventricular ejection fraction results in 15 patients admitted to hospital in whom no clinical, electrocardiographic, or radiological evidence of heart disease was found were used as a control group. In all of these patients a non-cardiac diagnosis for their symptoms was made, and no symptoms or signs of heart disease developed in the following 12 months.

RADIONUCLIDE TECHNIQUE
All ejection fraction measurements were made at the bedside using the portable probe initial transit method described by Steele et al. Results obtained with this method have been found to correlate well with contrast left ventriculography by three groups of workers. The portable probe detector was positioned perpendicular to the chest wall over the heart and the left ventricular position ascertained as follows. A metal paper clip was taped to the patient’s precordium in the fourth or fifth left intercostal space, 4–6 cm from the mid-sternal line. A chest radiograph was then taken with the patient supine and breathing quietly. This radiograph was used to determine the chest wall surface point overlying a point halfway between the midline and the cardiac apex and halfway between the upper and lower borders of the heart shadow. A circular cardboard target was taped to the precordium with its central hole over the point thus defined as overlying the mid left ventricle. Patients were studied supine or with their trunk tilted upright by 15°–30° if the supine position caused dyspnoea.

The radionuclide used was either ionic indium-113m 1–2 mCi (37–74 MBq), which binds to plasma transferrin to become an intravascular marker, or 1–2 mCi (37–74 MBq) of technetium-99m labelled human serum albumin. Each radionuclide dose was prepared in a volume of 1-0 ml and administered as a compact bolus using 5 ml of saline flush. All radionuclide injections were given through a 61 cm antecubital intravenous line whose tip was in the superior vena cava.

Two bolus injections of radionuclide were given 5–10 minutes apart for each study, the first for assessment of raw left ventricular activity, the second for the assessment of “background”. The initial transit of each bolus though the heart was detected with a collimated sodium iodine scintillation probe (Phillips). Lead collimation was used according to the specifications of Steele and centred precisely on the precordial target. For recording raw left ventricular activity annular lead shielding with a circular central portal 5 cm in diameter was used. For recording background activity, a 5 cm diameter lead disc was centred over the left ventricle, and activity in an annular region around this lead disc was recorded.9

Resultant activity was recorded with a high quality x-y plotter (Hewlett-Packard). A ratemeter time constant of 0-10 s was used for slow heart rates (<70 beats/min) to minimise statistical noise, whereas a time constant of 0-05 s was used for higher heart rates to avoid overdamping of the activity-time curves. The resultant left ventricular and background activity curves were recorded on transparent graph paper. The curves were superimposed and matched at two points: (a) the initial upwards deflection and (b) the horizontal tail after the initial transit was complete (Fig. 1). This matching was made more reproducible and simple by choosing the dose for the second (background) injection so that the tails of the two curves would have the same vertical height. In practice this meant using from 30% to 50% as much activity for the second (background) bolus as for the first. The pulmonary transit time (Fig. 1) was measured from the time when the right ventricular peak had fallen to 75% of its peak level to the time of peak left ventricular activity, as recommended by Pierson and Van Dyke.

Calculation of ejection fraction—Left ventricular ejection fraction was measured from the fractional decrease in net ventricular activity for each cardiac cycle, from the time of peak left ventricular activity until just before recirculation became apparent on either of the time-activity curves. The mean value of these individual cardiac cycles was used (Fig. 2).

Reproducibility of the method—Duplicate studies within half an hour in 35 patients showed highly reproducible results for ejection fraction: (initial
study 0-41 (0-13), second study 0-41 (0-12) with a standard deviation between the paired results of 0-04, \( r=0.95 \). In a further 14 patients measurements were made sequentially within two hours with the portable probe method and with a first pass method using a gammacamera interfaced to a minicomputer. Data for the latter were acquired in dynamic format in the 45° left anterior oblique projection and analysed as described by Steele et al.12 This gammacamera method was analogous to the probe method except that it enabled much more certain determination of left ventricular location. The ejection fraction results from these two radionuclide methods were not significantly different (probe 0-38 (0-14); gammacamera 0-36 (0-13) and correlated strongly with each other \( r=0.95 \). This suggested that the procedure for placing the probe used in this study successfully minimised potential errors due to malpositioning over the precordium.

**PROGNOSTIC ANALYSIS**

The initial ejection fraction value obtained after infarction was exclusively used for prognostic analysis. The median delay between the onset of symptoms and recording the initial value was 23-5 (range 1–71) hours. Twenty two patients were studied twice, initially within the first 24 hours and again 24 hours later, to determine the validity of considering together the prognostic significance of ejection fraction measurements obtained more and less than 24 hours after the onset of symptoms. The initial ejection fraction was related to the incidence of defined endpoints in hospital and after discharge from hospital.

**Inhospital follow-up**—The mean duration of hospital admission was 8–12 days. The inhospital endpoints were defined as follows: (a) primary ventricular fibrillation—ventricular fibrillation occurring without preceding cardiogenic shock; (b) pump failure death—death in hospital in a state of intractable cardiogenic shock or pulmonary oedema without clinical
Bedside ejection fraction and prognosis after infarction

or necropsy evidence of a mechanical cardiac defect such as rupture of the interventricular septum, papillary muscle, or free left ventricular wall; (c) other cardiac deaths—all cardiac deaths not due to pump failure as defined above.

Postdischarge follow up—The mean follow up period was 15 (range 9–21) months. The endpoints were defined as follows: (a) postdischarge sudden cardiac death—sudden death in the absence of clinical shock or cardiac failure with or without the onset of chest pain within the preceding hour; and (b) non-sudden cardiac death—death due to pump failure, which in all cases was associated with readmission to hospital.

STATISTICAL METHODS

Left ventricular ejection fractions are expressed as mean (standard deviation). Statistical analyses were performed with a Cyber 73 computer and the SPSS package of statistical programmes. Differences in mean left ventricular ejection fraction between subgroups were assessed using analysis of variance. Cross tabulations of non-continuous variables were analysed for statistical significance using the χ² test. Comparison of the prognostic significance of ejection fraction and clinical variables was performed with discriminant function analysis.

Results

OVERALL EJECTION FRACTION RESULTS

The mean ejection fraction in the 171 patients with acute myocardial infarction was 0.36 (0.11) (range 0.12–0.62). The mean value in the 15 control subjects without heart disease was 0.62 (0.07) (range 0.50–0.76). Only 11% of the patients with acute myocardial infarction had an ejection fraction >0.50, the lowest level found in the 15 control subjects.

In the 22 patients who had measurements both within the first 24 hours after the onset of symptoms and again 24 hours later, mean left ventricular ejection fraction was 0.35 (0.10) at the initial measurement and 0.36 (0.11) 24 hours later (NS). Interstudy variability (standard deviation 0.04, r=0.92) was not significantly different from that obtained in the 35 patients who had two studies <30 minutes apart.

RELATION TO HISTORICAL, ENZYMATIC, AND ELECTROCARDIOGRAPHIC FINDINGS

Ejection fraction was not significantly related to sex, age, or history of angina. It was related to the number of previous myocardial infarctions (p<0.001); none, 0.38 (0.11) (n=125); one, 0.32 (0.10) (n=34); two, 0.24 (0.12) (n=9); more than two, 0.17 (0.7) (n=3).

Ejection fraction was also related to enzymatic indices of the extent of acute myocardial necrosis (r=0.29 v peak creatine phosphokinase activity; p<0.001). The combination of peak creatine phosphokinase activity and the number of previous infarctions predicted ejection fraction better than either variable alone (multiple r=0.51; p<0.001 for each variable; Table 1).

The electrocardiographic site of infarction was strongly (p<0.001) and the presence or absence of pathological Q waves was weakly (p<0.05) related to ejection fraction. Among the 154 patients whose infarct location could be determined from the electrocardiographic changes, mean ejection fraction was highest with inferior infarction (0.41 (13); n=76), lower with anterior infarction (0.34 (11); n=57), and lowest with combined anterior and inferior infarction (0.29 (13); n=21); even lower values were found when the site of infarction was obscured by the presence of left bundle branch block (0.24 (11); n=11). Mean ejection fraction was lower in patients with Q waves (0.34 (10); n=101) than in those without (0.38 (12); n=59) (p<0.05; left bundle branch block excluded). The additive nature (p<0.001) of the interrelations between the electrocardiographic findings, history of previous infarction, and ejection fraction is shown in Table 2.

<table>
<thead>
<tr>
<th>Site of infarct</th>
<th>Inferior</th>
<th>Anterior</th>
<th>AnteroInferior or LBBB</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Q wave, initial infarct</td>
<td>0.44 (0.08) (15)</td>
<td>0.39 (0.09) (14)</td>
<td>0.31 (0.11) (2)</td>
</tr>
<tr>
<td>Q wave, initial infarct</td>
<td>0.41 (0.07) (43)</td>
<td>0.32 (0.11) (35)</td>
<td>0.31 (0.10) (10)</td>
</tr>
<tr>
<td>No Q wave, recurrent infarct</td>
<td>0.39 (0.09) (7)</td>
<td>0.32 (0.10) (6)</td>
<td>0.31 (0.09) (6)</td>
</tr>
<tr>
<td>Q wave, recurrent infarct</td>
<td>0.32 (0.12) (11)</td>
<td>0.23 (0.04) (2)</td>
<td>0.23 (0.12) (14)</td>
</tr>
</tbody>
</table>

*Six patients without localising electrocardiographic features are not included. LBBB, left bundle branch block.

Table 1 Cumulative effect of peak creatine phosphokinase activity and history of previous myocardial infarct on severity of depression of left ventricular ejection fraction. Values are mean (SD) left ventricular ejection fraction (numbers in parentheses are numbers of patients in each subgroup*)

Table 2 Additive effect on left ventricular ejection fraction of history of previous myocardial infarction, site of electrocardiographic localisation, and presence of Q waves. Values are mean (SD) left ventricular ejection fractions (numbers in parentheses are numbers of patients in each subgroup*)
Fig. 3 Individual admission ejection fractions for the 15 normal subjects and for status at hospital discharge of the 171 patients with acute myocardial infarction. VF, ventricular fibrillation; PFD, pump failure death; arrow indicates a fall in ejection fraction after reinfarction.

INHOSPITAL PROGNOSIS

Fig. 3 shows the relation of admission ejection fraction to status at discharge. The 145 patients who left hospital alive without requiring resuscitation from ventricular fibrillation had a mean admission ejection fraction of 0.38 (0.11). The eight patients who had primary ventricular fibrillation in hospital had significantly lower admission ejection fractions (mean 0.24 (0.06), p<0.001); all left hospital alive after resuscitation.

In all 12 patients who died of pump failure initial ejection fraction after the fatal episode of infarction was <0.35. Ten patients who died from primary pump failure without clinical evidence of reinfarction had a mean admission ejection fraction of 0.18 (0.05). The two other patients to die of pump failure in hospital did so after reinfarction. The initial ejection fractions in these two patients were initially higher than in the other patients to die of pump failure (mean 0.32 (0.04) but fell when remeasured within 24 hours of reinfarction (mean 0.19 (0.05)) (Fig. 3). Individual ejection fractions in the group of patients who subsequently died of pump failure overlapped considerably with those of other subgroups (Fig. 3). There was much less overlap between the pulmonary transit times of the patients who died of pump failure (mean 17.6 (3.8) s, range 11–22 s) and those of other patients (mean 8.1 (3.4) s, range 4–29 s) (Fig. 4). Pulmonary transit time was >14 s in 11 out of 12 patients who died in hospital but in only 3 out of 159 others (p<0.001).

In the six patients who died in hospital of cardiac causes other than pump failure the mean admission ejection fraction was 0.44 (0.11), which is not significantly different from the values found in the hospital survivors. The causes of death in this group of patients comprised cardiac rupture (two), electromechanical dissociation (one), and ruptured papillary muscle or ruptured interventricular septum (three). In these three patients the radionuclide time activity curves suggested a left to right shunt; in each case they differed from those of all other patients in showing a very prolonged washout phase of the left ventricular peak despite normal pulmonary transit times and an ejection fraction >0.35.

POSTDISCHARGE PROGNOSIS

Of the 153 hospital survivors, 13 (9%) died during follow up. Three of the deaths were due to cardiac failure, whereas 10 were sudden. Of the sudden deaths, fatal collapse was witnessed in six, but unwitnessed in two and was due to documented ventricular fibrillation after the onset of chest pain in the remaining two.

Fig. 5 shows the relation between admission ejection fractions and the follow up status of hospital survivors. The mean admission ejection fraction in the 13 patients who died after discharge was significantly lower (0.25 (0.09)) than in the 140 patients still alive a mean of 15 months after acute myocardial infarction (0.38 (0.10); p<0.001). In the 10 patients who died suddenly during follow up the mean ejection fraction was 0.27 (0.09), and in the three patients whose death was not sudden it was 0.19 (0.09) (NS vs sudden deaths). The patients who died during follow up included all three hospital survivors with pulmonary transit times >14 s (Fig. 4).

TOTAL EFFECT ON PROGNOSIS

Table 3 summarises the overall association between prognosis and admission ejection fraction; all episodes of primary ventricular fibrillation or of death due to pump failure in hospital and all but one postdischarge death occurred when the admission ejection fraction was <0.35.

PROGNOSTIC ACCURACY OF ADMISSION EJECTION FRACTION vs CLINICAL INDICES

Discriminant function analysis showed that the admission ejection fraction had greater overall prognostic significance for the development of ventricular fibrillation, pump failure death, or postdischarge death than any non-radionuclide variable. A history of previous infarction, peak creatine phosphokinase
Bedside ejection fraction and prognosis after infarction

Fig. 4 Ejection fraction in relation to pulmonary transit time, diagnosis, and inhospital prognosis. Patients who died of other causes than pump failure death are not shown. VF, primary ventricular fibrillation (arrows indicate changes with recurrent infarction).

Table 3 Overall relation of admission left ventricular ejection fractions to prognosis except for deaths attributable to mechanical cardiac defects

<table>
<thead>
<tr>
<th>Ejection fraction</th>
<th>&gt;0.34</th>
<th>&lt;0.35</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of patients</td>
<td>90</td>
<td>81</td>
</tr>
<tr>
<td>(A) With primary ventricular fibrillation</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>No of deaths:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(B) In hospital due to pump failure</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>(C) After discharge</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>No (%) of patients with (A), (B), or (C)</td>
<td>1 (1)</td>
<td>30† (36)*</td>
</tr>
</tbody>
</table>

*p<0.001. †Two patients had both (A) and (C).

activity, and electrocardiographic features had no independent prognostic significance for these endpoints when the ejection fraction was known. The most prognostically important non-radionuclide variable was the appearance of the lung fields on the initial chest radiograph. Table 4 shows the interrelation between these prognostic endpoints, the chest x ray findings, and an ejection fraction <0.35. Both the ejection fraction and the chest x ray findings had independent prognostic significance, but that of the ejection fraction was greater.

Fig. 5 Individual admission ejection fractions of the normal subjects and the 153 hospital survivors of acute myocardial infarction in relation to status at the end of follow up after discharge. VF, ventricular fibrillation before hospital discharge.
Table 4  Additive overall prognostic value of left ventricular ejection fraction and the appearance of the lung fields on the initial chest radiograph for ventricular fibrillation, death due to pump failure in hospital, and death after discharge. For each subgroup the number of patients with one or more of these prognostic end points/total patients in subgroup (%) is indicated.

<table>
<thead>
<tr>
<th>Lung fields</th>
<th>Left ventricular ejection fraction (% of patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt;0.34</td>
</tr>
<tr>
<td>Normal</td>
<td>1/75 (1)</td>
</tr>
<tr>
<td>Congested</td>
<td>0/9 (0)</td>
</tr>
<tr>
<td>Pulmonary oedema</td>
<td>0/6 (0)</td>
</tr>
</tbody>
</table>

Discussion

This study adds to previous evidence on the prognostic importance of left ventricular ejection fraction in patients with myocardial infarction. A strength of this study in comparison to other studies is the inclusion of a near complete spectrum of a large group of consecutive patients admitted with myocardial infarction to a coronary care unit over 12 months. In particular, the study protocol is unique in that it enabled left ventricular ejection fraction to be obtained in significant numbers of patients before ventricular fibrillation and before death due to pump failure. Other strengths of the study include the measurement of ejection fraction within 72 hours of the onset of symptoms in all cases and the correlation of results with both inhospital and postdischarge prognosis in relation to clinical variables. Our ejection fraction measurements were obtained with the first pass portable probe radioisotope method described by Steele et al. This technique was able to obtain bedside data from these critically ill patients more promptly, more conveniently, and less expensively than radionuclide ventriculography with a portable gammacamera and computer.

The range of admission ejection fractions in this large group of patients after acute myocardial infarction (mean 0.36 SD 0.12) is similar to radionuclide results found in smaller groups by Rigo et al and by Schelbert et al. Our results suggest that there is little overall change in ejection fraction in the first 24–72 hours after myocardial infarction.

HOSPITAL PROGNOSIS

The correlation of admission ejection fractions with subsequent clinical outcome has confirmed and extended the finding by Rigo et al, Schelbert et al, and Shah et al that ejection fractions <0.35 soon after acute myocardial infarction are related to hospital mortality, primarily from pump failure. Nevertheless, ejection fractions in patients who died in hospital of pump failure still appreciably overlapped those of other groups of patients, and a better prediction of death due to pump failure by pulmonary transit times was possible. Prolongation of pulmonary transit time probably adds independently important prognostic information when ejection fraction is severely depressed. Presumably this is because it reflects both decreased cardiac output and also to a lesser extent increased lung blood volume. There may, however, be inaccuracies in measuring very low ejection fractions; non-gated radionuclide techniques tend to overestimate very low ejection fractions and cannot resolve decreases in ejection fractions <0.15–0.20 owing to Poisson statistical fluctuation in recorded counts. Although these statistical uncertainties are less with a probe detector than a gammacamera, this factor could still have prevented accurate resolution of ejection fractions <0.15 in this study.

Schulze et al reported that high grade ventricular arrhythmias detected with 24 hour ambulatory electrocardiograms before discharge after acute myocardial infarction were virtually confined to that subgroup of patients whose predischarge radionuclide ejection fraction was <0.40. Our study has further shown that ejection fractions in this range are highly related to the risk of ventricular fibrillation in hospital, as all such episodes occurred in patients with admission ejection fractions <0.35.

In contrast to death due to pump failure and potential death due to ventricular fibrillation, death due to cardiac rupture and other mechanical defects could not be predicted by ejection fraction in our study.

POSTDISCHARGE PROGNOSIS

As with pump failure death or ventricular fibrillation in hospital, mortality in the postdischarge follow up period occurred mainly in patients whose admission ejection fraction was <0.35, with 12 out of 13 postdischarge deaths occurring in this subgroup. These findings of the postdischarge phase of our study agree with those of other studies which obtained radionuclide ejection fraction measurements under resting conditions at a later period after myocardial infarction, shortly before discharge from hospital. They also agree with combined rest and exercise left ventricular ejection fraction studies after recovery from acute myocardial infarction, which have found that ejection fraction <0.35 at rest was the major independent predictor of death in the subsequent year. Thus our results indicate that ejection fractions measured immediately after hospital admission have as much prognostic value after discharge as those measured immediately before, or shortly after, discharge from hospital.
Bedside ejection fraction and prognosis after infarction

EJECTION FRACTION, VENTRICULAR FIBRILLATION, AND SUDDEN DEATH

In this study nine out of 10 postdischarge sudden deaths occurred in patients with ejection fractions <0.35. A strong association between ejection fractions <0.35 measured two weeks after infarction and sudden death in the following year has been reported by Schulze et al.24 Sudden cardiac deaths are most likely to be due to ventricular fibrillation, and in two of the postdischarge sudden deaths this was directly documented. Furthermore, all eight of our patients who had primary ventricular fibrillation in hospital had admission ejection fractions <0.35. Our study therefore shows evidence of a pronounced association between advanced left ventricular dysfunction after acute myocardial infarction and susceptibility to ventricular fibrillation. In contrast to ejection fractions, ventricular arrhythmias detected during monitoring in the coronary care unit were not significantly predictive of either ventricular fibrillation in hospital or sudden death after discharge. Braat et al25 have recently reported that ejection fractions <0.40 strongly predicted sustained ventricular tachycardia during six weeks of continuous ambulatory electrocardiographic monitoring but that the presence or grade of ventricular arrhythmias detected on 24 hour ambulatory electrocardiograms after acute myocardial infarction did not. Our data add to those of Schulze et al24 and Braat et al25 on the importance of the association between low ejection fractions and fatal ventricular arrhythmias, specifically with regard to documented ventricular fibrillation. Presumably this association is related to the amount of unstable ischaemic myocardium which is present when the ejection fraction is <0.35.

PROGNOSTIC SIGNIFICANCE OF EJECTION FRACTION RELATIVE TO CLINICAL VARIABLES

The additive ability of the number of previous infarctions, peak cardiac enzyme activity, and electrocardiographic indicators of site and severity of myocardial infarction to predict ejection suggests that ejection fractions reflect the cumulative extent of left ventricular damage from both present and previous infarcts. The fact that these non-radiouclide variables had no independent prognostic significance when ejection fraction results were known suggests that their pronostic significance is primarily attributable to their association with depressed left ventricular ejection fractions.

The potential clinical value of ejection fraction measurements after myocardial infarction depends largely on whether their prognostic significance adds to that of more easily obtained clinical information. Our discriminant function analysis results indicate that ejection fraction measurements do add to the prognostic data obtainable from standard clinical, enzymatic, electrocardiographic and radiographic investigations.

This study was supported by a grant from the National Heart Foundation of Australia.

References

12 Steele P, Kirch D, Matthews M, Davies H. Measurement of left heart ejection fraction and end-diastolic volume by a computerized, scintigraphic technique using a wedged pulmonary arterial catheter. Am J Cardiol 1974; 34: 179–86.
14 Nie NH, Hull CH, Jenkins JG, Steinbrenner K, Bent DH, eds. Statistical package for the social sciences. 2nd ed.


Prognostic significance of left ventricular ejection fraction after acute myocardial infarction. A bedside radionuclide study.

M J Kelly, P L Thompson and M F Quinlan

*Br Heart J* 1985 53: 16-24
doi: 10.1136/hrt.53.1.16

Updated information and services can be found at:
[http://heart.bmj.com/content/53/1/16](http://heart.bmj.com/content/53/1/16)

**Email alerting service**

Receive free email alerts when new articles cite this article.
Sign up in the box at the top right corner of the online article.

**Notes**

To request permissions go to:
[http://group.bmj.com/group/rights-licensing/permissions](http://group.bmj.com/group/rights-licensing/permissions)

To order reprints go to:
[http://journals.bmj.com/cgi/reprintform](http://journals.bmj.com/cgi/reprintform)

To subscribe to BMJ go to:
[http://group.bmj.com/subscribe/](http://group.bmj.com/subscribe/)