The problems are clear enough, but solutions are elusive. Before long research may produce a specific sensitive tumour marker, but meanwhile clinicians must attempt to agree on the best practical criteria of response and adopt them internationally. At present the thread of truth joining many studies has become snared in their disparities.


Ventricular defibrillation

In many hospitals the standard practice is to attempt correction of ventricular fibrillation by direct-current shock with the maximum charge available. For most commercially available defibrillators this is around 400 joules (J). Is this charge adequate? As long ago as 1974 a retrospective study had suggested that body weight might be an important limiting factor in these circumstances and that a defibrillator with a maximum stored energy of only 400 J would fail to defibrillate 35% of patients weighing more than 50 kg.1 Experimental evidence also suggested that the electrical threshold required for defibrillation rose in the early stages of myocardial infarction, so that high-energy defibrillators might be particularly important in this clinical setting.2 If that view had proved correct it would have increased the cost and size of defibrillators and made them more difficult to handle, as well as presenting possible hazards to the myocardium from high-energy electrical discharge.3

An alternative assessment was, however, quickly forthcoming from Pantridge and his colleagues in Belfast, who presented evidence that ventricular fibrillation complicating acute myocardial infarction was usually responsive to low-energy discharge.4 5 In a prospective study they showed that 42 (81%) of 52 episodes of ventricular fibrillation responded to 100 J stored energy and that 212 (95%) of 223 episodes were corrected by 200 J. Among a group of patients in whom ventricular fibrillation complicated myocardial infarction within the first hour 98% of episodes were corrected by 200 J shocks. Failure to respond to one low-energy shock was often followed by success when the same energy discharge was used a second time. When a low-energy shock failed one of 400 J was invariably successful. Pantridge et al drew attention to the importance of technique, including the correct positioning and preparation of the electrode paddles; body weight was not a problem in their studies.

There the controversy rested for a while, but further evidence has recently emerged that commercially available defibrillators are adequate. In a retrospective study of 52 patients in whom defibrillation had been attempted during two years 38 patients were successfully defibrillated and 14 were not, despite repeated attempts.6 The standard resuscitative procedure was cardioversion with the maximum charge available, which for most of the defibrillators varied from 200 to 400 J. Though those patients in whom defibrillation failed had a higher body weight the difference was not statistically significant. The main difference separating the patients who were successfully defibrillated from their fellows was a mean delay of seven minutes before cardioversion as opposed to 17 minutes in patients in whom defibrillation failed. Delay was also associated with a higher incidence of acidosis and hypoxaemia among the defibrillation failures. The difficulty of achieving good external cardiac massage and adequate ventilation in the obese was put forward as a possible explanation for failure to defibrillate some of the heaviest patients in the study.

In a recent prospective study7 the standard procedure in the presence of ventricular fibrillation was an initial shock of 200 J stored energy. With this relatively low-energy discharge 75% of patients were defibrillated at the first shock and 95% after further shocks as necessary. The success of defibrillation showed no relation to the patients’ weight. In contrast to the preceding study, delay before attempted defibrillation was not a deciding factor in determining outcome, though where this could be determined the delays were mostly shorter—around three minutes. The clinical setting of the ventricular fibrillation was, however, critical in determining outcome in those patients with acute myocardial infarction or ischaemia. In the absence of severe hypotension or left ventricular failure successful defibrillation with low-energy shock was the rule, whereas success was less frequent in patients with these complications, which suggest extensive myocardial injury.

No case has been made, therefore, for the development of high-energy defibrillators. Instead the priority should be immediate defibrillation with low-energy shock, minimising delay and so avoiding the steady deterioration in myocardial perfusion that is likely to follow prolonged periods of external cardiac massage and other supportive manoeuvres. In the hospital setting these conclusions provide further justification for nursing patients at high risk in coronary care units, where properly trained nurses can diagnose and defibrillate patients without delay.