CASE REPORT

Apparent asystole: are we missing a lifesaving opportunity?

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SUMMARY

The use of ultrasonography is rapidly expanding in emergency medicine. Real-time assessment offers clues to prompt diagnosis and creates opportunities for speedy intervention. We present a case of 'cardiac monitor asystole' that proved to be ventricular fibrillation on ultrasound examination. Uniquely this case demonstrates that this, typically unrecognised, form of ventricular fibrillation responds to desynchronised defibrillation, with restoration of perfusion for approximately 30 min. With increasing access to ultrasound we believe that further research is indicated to determine whether some cases of apparent asystole may best be treated by defibrillation, presenting an opportunity to save more lives than current protocols achieve.

BACKGROUND

The use of ultrasonography is rapidly expanding in emergency medicine exemplified by: its bedside utilisation in the assessment of trauma, imaging of the abdominal aorta, the lungs and the heart.¹⁻³ Real-time assessment offers clues to prompt diagnosis and creates opportunities for speedy intervention. This instant feedback is of most obvious benefit in cardiopulmonary resuscitation, where findings can be used to guide immediate management⁴ and have been shown to predict outcome.⁵ We present a case where bedside ultrasonography offered an opportunity to save a life, when otherwise resuscitation would have been abandoned.

CASE PRESENTATION

A 43-year-old man presented to the accident and emergency department by the Helicopter Emergency Medical Services (HEMS). He had been found unresponsive at home, with a Glasgow Coma Score of three. His family reported a background of heavy alcohol intake and a 2-day history of haematemesis. After intubation by the HEMS team he lost spontaneous circulation: on arrival in the resuscitation room he was undergoing active cardiopulmonary resuscitation (CPR) and had received three doses of epinephrine with no apparent affect. The defibrillator initially demonstrated pulseless electrical activity, so went on to receive 10 cycles of CPR, including the administration of five doses of epinephrine and 4 units of blood. Despite this the cardiac monitor suggested progression to asystole and discussions around cessation of CPR began.

At this point bedside ultrasound was utilised and demonstrated fine ventricular fibrillation (video 1). He received a 150 J desynchronous shock with the

return of spontaneous circulation (figure 1). Unfortunately, despite subsequent management, he lost cardiac output 30 min later and progressed to true asystole. Despite further resuscitation there was no improvement and ultimately CPR was stopped.

DISCUSSION

Routine defibrillation in asystole is currently not recommended in the Advanced Life Support (ALS) protocol³ as there is currently no proven survival benefit.⁶ We would like to propose that there may be specific cases in which this approach is inappropriate.

There has always been some recognised response of patients in asystole to defibrillation: for example, one study implemented an immediate 'counter-shock' in 119 patients presenting in asystole, demonstrating the development QRS complexes in 8.4%.⁷ Apparent cardiac monitor asystole has been previously demonstrated to misrepresent ventricular fibrillation: both with enhanced assessment using multiple chest leads⁸ and also using bedside ultrasonography.⁹ We present a case where, after ultrasound recognition of fibrillation despite apparent asystole, a desynchronous shock was delivered resulting restoration of circulation for a significant duration of time. Could echocardiography be a useful tool to discriminate those patients with 'apparent' asystole in whom an initial defibrillation attempt would be appropriate?

Although this case does demonstrate that there is at least some response to defibrillation in this cohort of ventricular fibrillation, appearing as apparent asystole, it does not give evidence of its magnitude or ultimate prognosis. Previous studies

Video 1 The fine irregular motion of ventricular fibrillation can be clearly seen, despite cardiac monitor asystole.

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Figure 1 Postcardioversion ECG demonstrating electrical activity compatible with a perfusing heart rhythm.

have found a strong correlation between the magnitude of ventricular fibrillation waveform to response to defibrillation¹⁰ and prognosis,¹¹ demonstrating poorer outcomes in finer waveforms. Of note, however, there is successful resuscitation from even fine ventricular fibrillation. There is currently no data available on the cohort of patients we describe, with this being the first case demonstrating successful defibrillation; with implementation of this approach it would be interesting to see the outcome profile of these patients after attempting defibrillation.

To put this in perspective: the London Ambulance Service attempted resuscitation on 2157 patients in asystole last year,¹² and in a study mentioned earlier 3 of 118 cases (2.54%) of 'asystole' in out of hospital arrests were found to be in ventricular fibrillation.⁸ This suggests there may have been 55 patients in the London area alone who may have missed out on an attempt at defibrillation in that year. There will be many more such cardiac arrests within other ambulance services, presenting directly to accident and emergency and affecting patients who are in hospital: the incidence of this occult rhythm could be very substantial.

With increasing access to ultrasonography in emergency departments, its use must be harnessed where possible to improve patient outcomes. Focused ultrasonography is already being taught for use in cardiac arrest, though this is largely limited to investigating for potential reversible causes of pulseless electrical activity, such as tamponade and pulmonary embolism.¹³ Studies have already considered the incorporation of ultrasonography into ALS protocol: finding it feasible and with evidence it could guide patient management.^{14 15}

This case suggests that with current practice we may be missing the potential for lifesaving intervention in ventricular fibrillation, detectable by ultrasound and further supports the use of bedside ultrasonography in cardiac arrest.

Patient's perspective

A letter was sent to this patient's next of kin. His response is as follows: "Thank you for your letter regarding (case patient). You have my full support for the ultrasound scan. I hope it will be used in the future and hopefully save lives."

Learning points

- ▶ We have provided further evidence, as in previous studies,^{8 9} that cardiac monitor asystole can misrepresent underlying ventricular fibrillation.
- ▶ We uniquely demonstrate that this, typically unrecognised, ventricular fibrillation responds to desynchronous defibrillation: In this case with a restoration of perfusion for roughly 30 min.
- ▶ Although there is no proven evidence that defibrillation is appropriate for all asystole when applying the Advanced Life Support (ALS) protocol; are we missing possible life saving treatment in the cohort where this hides ventricular fibrillation?
- ▶ With the improvement of equipment available and increasing accessibility to ultrasound,¹⁶ we believe this case adds further evidence to support its integration with ALS. We encourage further research into the use of ultrasound in cardiac arrest.

Contributors CL undertook literature review and writing of the case report. MAS managed the case, involved in revision of the work and is nominated guarantor.

Competing interests None.

Patient consent Obtained.

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