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Letter to the Editor

‘Reply to:’ Importance of the distinction between recurrent and shock-resistant ventricular fibrillation: Call for a uniform definition of refractory VF



Reply

We thank Nas and colleagues for their interest in our work and acknowledge the lack of a uniform definition for refractory or shock-resistant ventricular fibrillation (VF). Although refractory VF refers to persistent VF that fails to respond to at least three defibrillation attempts,¹ the condition is typically self-reported by rescuers and is often not verified using electrocardiogram records.² In comparison, recurrent VF occurs when defibrillation successfully terminates VF, only to recur rapidly and usually within two minutes of shock delivery.³ As CPR is commenced immediately after a shock is delivered, recurrent VF often goes unrecognised by rescuers due CPR artefact on the monitor.¹

Indeed, both of the observational studies included in our meta-analysis are at risk of unknowingly including episodes of recurrent VF.^{2,4} Neither study reported having reviewed electrocardiogram records to verify the condition and this resulted in a downgrading of their methodological quality.⁵ Although we attempted to perform a sub-analysis of cases defined solely as refractory VF, it is possible that both studies are contaminated with a number of recurrent VF cases which could influence the direction and magnitude of benefit of double sequential external defibrillation (DSED). Importantly, recurrent VF could be as much as seven times more prevalent than refractory VF in patients with an initial VF arrest.³

Distinguishing between refractory and recurrent VF in practice is also challenging. Brief episodes of cardioversion are usually missed due to CPR artefact on the electrocardiogram, and a significant number of emergency medical services use automated external defibrillators without the ability to manually interpret rhythms. Electrocardiogram records are often difficult to obtain from the field, are time consuming to analyse, and require clinically-trained personnel for review. As such, registry-based studies involving refractory VF populations are often limited by data variables which lack the relevant detail to identify episodes of recurrent VF.² Although CPR-filtering technology may be useful in identifying recurrent VF patients, there are no human studies showing improvements in patient outcomes from their use and they are not currently recommended for use outside of a research programme.¹

Unfortunately, very little is known about the mechanism of action of DSED to comment on its potential effect in recurrent VF populations. Although some authors suggest that DSED would be less effective for recurrent VF,⁴ there are some proposed mechanisms of action of DSED which could in fact be useful for recurrent VF, including: a larger current, lowering of the defibrillation threshold, and a change in the vector of electricity across the myocardium.⁵ Successive episodes of recurrent VF are also less responsive to single shock regimes and could therefore benefit from higher energy shocks.^{1,3} As such, there may be some value in a prospective study evaluating the role of DSED in VF patients where the initial three defibrillation attempts have failed to restore a sustained and organised cardiac rhythm. This would potentially expose both recurrent and refractory VF patients to DSED.

Conflicts of interest

None declared.

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