Defibrillation success in out-of-hospital cardiac arrest: Point in time of ventricular fibrillation recurrence after successful shock during early phase of cardiopulmonary resuscitation

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Purpose of the study:

In out-of-hospital cardiac arrest (OHCA) with ventricular fibrillation (VF) guidelines recommend defibrillation with biphasic shock [1], followed by chest compressions for two minutes before analyzing shock success. If then VF is detected again, it is unclear whether VF persisted or – after successful defibrillation – reoccurred within the two-minutes-cycle of chest compressions [2].

We investigated the point in time of VF-recurrence.

Materials and Methods:

Between February 2014 and March 2018 we examined 185 consecutive shocks in a retrospective study of resuscitation attempts by ALS-ambulance in OHCA with initial VF (Marburg-Biedenkopf-County, Germany, 252,000 inhabitants). Three independent investigators analyzed ECG-recordings of the defibrillator Corpuls3 from the beginning of the CPR until two minutes after the third shock. Using filters from 2-10 Hz we reduced chest compression-artifacts. Successful shock was defined as VF-termination within 5 s after the shock (Figure 1.1) [3]. A relapse was defined as VF-recurrence in the interval between 5 s after a shock and the following shock (Figure 1.2). An unsuccessful shock was defined as persistent VF within 5 s after the shock (Figure 1.3).

Figure 1.1: Return of organized rhythm

Figure 1.2: Relapse, recurrent VF

Figure 1.3: Persistent VF

Results:

We analyzed 185 shocks in 82 patients. 74.1% (n=137) of the shocks were successful, recurrence-rate of VF was 88.3% (n=121, Figure 2.1). The median of point in time of VF-recurrence was 33 s (16 s/106 s) s after shock. 47.1% (n=57) of VF-recurrence occurred ≤ 30 s after shock. 12.4% (n=15) of VF-recurrence occurred 31-60 s after shock. 13.7% (n=16) of VF-recurrence occurred 61-90 s after shock. 27.3% (n=33) of VF-recurrence occurred >90 s after shock (Figure 2.2).

Figure 2.1: Defibrillation success

Figure 2.2: Point in time of VF-recurrence

Conclusions:

Although VF was terminated by rectilinear-waveform-defibrillation in 74%, VF recurred within two minutes of chest compressions in 88%. Thus, VF reappears frequently and early. It is unclear to which extend chest compressions influence VF-relapse. Further studies need to reevaluate the best shock-compression-analysis-algorithm and the regime of antiarrhythmic therapy [4] in the early phase of CPR in OHCA with initial VF.

References:

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