BIPHASIC VERSUS MONOPHASIC


All study patients were previously refractory to monophasic cardioversion. In this particularly difficult-to-cardiovert population, 61% of patients receiving a biphasic shock were cardioverted successfully, compared to 18% of patients who received a 360J monophasic shock (p<0.001). Furthermore, 44% of patients who failed to cardiovert with 150J, then 200J biphasic shocks, were successfully cardioverted with a subsequent 360J biphasic shock.


When compared at equivalent energies up to 360J, ADAPTIV biphasic technology provided significantly greater cardioversion success than monophasic (p<0.001).


At equal energy levels, ADAPTIV biphasic shocks resulted in resumption of an organized rhythm in a larger proportion of patients than monophasic shocks.

An initial 200J ADAPTIV biphasic shock terminated most VF episodes for at least 5 seconds (98%).

COMPARISON OF EFFICACY OF BIPHASIC WAVEFORMS


There were no significant differences in efficacy between ADAPTIV biphasic truncated exponential (BTE) and ZOLL® biphasic rectilinear (BRL) waveforms up to 200J. However, the BTE shocks cardioverted with less cumulative delivered energy than the BRL shocks (120 versus 157J, p = 0.009). Some patients who failed with BRL at its maximum 200J were cardioverted when crossed over to BTE at 360J. All ZOLL 200J crossover shocks were unsuccessful (5 total) after 360J failed to cardiovert.


At identical energies up to 200J, there was no significant difference in success between BTE and BRL technologies. Both patients who failed with BRL at its maximum 200J were cardioverted when crossed over to BTE at 360J.


In difficult-to-defibrillate conditions, there were statistically significant differences between four biphasic waveforms, with ADAPTIV biphasic showing the highest efficacy.
**FULL ENERGY/DOSE ESCALATION**


ADAPTIV biphasic shocks escalating from 200 to 360J terminated VF very well and were associated with good 30-day survival in the large cohort of patients with prehospital cardiac arrest. An initial 200J ADAPTIV biphasic shock terminated most VF episodes (92%). Escalation of the shock dosage to 360J in patients experiencing recurrent or persistent VF, was associated with effective VF termination (less than 0.5% of patients were unable to be defibrillated). Overall, 27% of all patients are known to have survived to 30 days. Of these, 50% received a 360J shock.

Also see:


Patients that are difficult to defibrillate are not a “lost cause”. In the most difficult-to-defibrillate patients, VF was eventually successfully terminated with 360J shocks in all 51 patients in this subset and 27% (14/51) survived to hospital admission. While a 200J shock terminates the first episode of VF in most (92%) patients, the success rate for terminating VF with the first shock for later VF episodes significantly decreases. The study further found that the percent of patients shocked to an organized rhythm increased with successive VF episodes, indicating that repeated exposure to 360J shocks did not harm the heart’s ability to return to organized activity.


In an experimental model of ischemically induced VF, escalating doses were more effective at terminating VF than fixed, lower-energy shocks (p<0.002).


A triple-blinded, multi-center randomized controlled trial of 221 OOH cardiac arrests found that in patients who received more than one AED shock, an escalating higher energy protocol provided significantly higher rates of conversion to an organized rhythm (36.6% vs 24.7%, p=.035) and termination of VF (82.5% vs 71.2%, p=.027) compared to a fixed lower energy protocol.


Twelve percent of patients remained in VF throughout EMS treatment, when dose was limited to a maximum 200J biphasic rectilinear.


In a clinical trial comparing escalating and non-escalating BTE shocks, the escalating dose protocol provided a significantly higher rate of defibrillation by the third shock (83% versus 92%, p=0.03).

**PEAK CURRENT/MYOCARDIAL DAMAGE**


Voltage gradient is a direct measure of the actual intensity of a shock and is associated with a likely mechanism of injury from shocks. The peak current and intracardiac voltage gradient produced by ADAPTIV 360J biphasic shocks were not different than those produced by ZOLL and Philips 200J biphasic shocks and lower than those produced by monophasic 150J shocks.

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