RELATIONSHIP BETWEEN TRANSSTHORACIC IMPEDANCE AND BIPHASIC CURRENT REQUIRED FOR VENTRICULAR FIBRILLATION

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It has been commonly thought that impedance optimizes when it is minimized, since this lets the most current flow via the heart’s tract. We began evaluating defibrillation efficacy of sinusoidal biphase current in patients (n=24) with secondary ventricular fibrillation (SVF). Mostly SVF occurred in cases of cardiac failure. Duration (T) of SVF was about 0.5-7 min. Diameters of hand-held electrode paddles were 11/11 cm. The peak current (IA), transchest impedance (TTLC) and delivered energy (DE, J) were measured. Results (mean±SD and range):

TTI, Ω I, A DE, J T(min) n
77±10 14.5±5.3 59±53 2.7±1.7 11
(66–99) (9-26) (18-186) (0.5-7.0)

36±8.3 22.7±4.7 67±47 2.6±1.8 13
(22-50) (18-35) (39-197) (0.5-7.0)

These data show that with decrease of average TTI from 77 Ω to 36 Ω, average defibrillating current increases by 57% (P<0.001) in patients with SVF. The correlation coefficient between TTI and I was 0.69. Perhaps pleural effusion, pulmonary edema, etc. could cause changes in TTI and shunt current around the heart decreasing its transcardiac fraction.

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A COMPARISON OF TRANSSTHORACIC IMPEDANCE USING STANDARD DEFIBRILLATION PADDLES AND SELF-ADHESIVE DEFIBRILLATION PADS


Introduction: The success of defibrillation is determined by transmyocardial current. This current is inversely proportional to transmyocardial impedance (TTI) which in turn is related to the electrical contact between defibrillator paddle and skin. Many defibrillations use self-adhesive defibrillation pads as an alternative to standard defibrillation paddles but differences in TTI have not been documented.

Methods: TTI using defibrillation paddles was compared with self-adhesive defibrillation pads to establish which technique provided least transmyocardial impedance. TTI was measured using a 30 kV AC current in 34 adult males by medical or nursing staff trained in defibrillation. Defibrillation paddles and self-adhesive defibrillation pads were placed in the antero-apical position.

Results:

TTI (Ω) Mean CI 95% CI
Heuwet-Packard Paddles (A) 65.4 69.1 62.6 91.9
Paddles (B) 77.5 57.3-66.4 58.3-66.9 85.6-98.1

Conclusion: Significant differences existed between all groups (P<0.05) except between B and C. Differences in TTI between A, B and C are small and probably of no clinical significance. TTI in group D is significantly larger and requires further study to determine the effects on defibrillation.

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RESULTS OF A SERIES OF TRIALS TO DETERMINE IF GLYCERAL TRINITRATE (TRANSDERMAL) OINTMENTS: PATCHES NEED TO BE REMOVED PRIOR TO DEFIBRILLATION

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Introduction: In the mid-1980s reports were received from the USA which led to hazard notices being issued stating that all GTN patches and ointments should be removed from a patients chest before defibrillation is carried out due to the risk of explosion from the nitroglycerine content of the preparations. The removal of the patches or any ointment, leading to possible delays in treatment. The authors therefore conducted research with various types of patches and ointments to determine if the current patch preparations do still present such a hazard.

Method: This was achieved by passing a defibrillation current through a conductive plate equal to the chest impedance of a patient and placing patches at different distances from the paddles and under the paddles themselves to measure the reaction.

Results: The research proved that it is not the GTN content of the patch which explodes as reported, but rather that the foil contained in some of the patch designs which tended to act as a ‘third’ paddle, causing a large electrical breakthrough with a resultant ‘flash’. Tests on non-metallic GTN patches proved this theory. In addition, GTN ointments did not produce any explosions or arcing as reported.

Conclusions: These tests have important implications for medical patch design for the future and until all patches may be manufactured utilising plastic membranes rather than metal, the advice given during defibrillation procedures needs to be revised to include the removal of all transdermal patches rather than just those containing GTN.