

The shocking lack of significant increases in high sensitivity troponin values after cardioversion

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Background and introduction: Cardioversion is commonly used to terminate cardiac arrhythmias. Some previous reports have suggested that cardioversion results in myocardial injury as evidenced by increased levels of cardiac troponin. However, many of these studies were done years ago with less sensitive troponin assays and monophasic waveform defibrillators.

Purpose: To determine if external direct current (DC) cardioversion with biphasic rectilinear waveform shocks results in myocardial injury as assessed by high sensitivity cardiac troponin T (hs-cTnT) and I (hs-cTnI).

Methods: Patients scheduled for elective DC cardioversion for atrial fibrillation or atrial flutter were recruited. Plasma samples for measurement of hs-cTnT and hs-cTnI were obtained pre-cardioversion and as late as feasible but at least 6 hours post-cardioversion [median of 9 (7–11) hours].

Results: A total of 96 patients were recruited. One patient was excluded because the pre-cardioversion sample was hemolysed. Median (25th–75th interquartile range) cumulative energy delivered was 121.6J (62.4–277.4J) and median highest energy individual shock was 121.0J (62.1–146.2J). A total of 39 (41.1%) patients received more than 1 shock, 23 (24.2%) patients received a cumulative energy of 300J or higher and 5 (5.3%) patients received a cumulative energy of 1,000J or more. The median pre-cardioversion hs-cTnT value was 11.48 (7.19–18.38) ng/L and the me-

dian hs-cTnI value was 5.1 (2.0–9.4) ng/L. Median post-cardioversion hs-cTnT value were 12.46 (7.98–20.28) ng/L and hs-cTnI value were 6.3 (3.5–10.0) ng/L. Wilcoxon-Signed ranks test showed a statistically significant change between the pre-and-post cardioversion hs-cTnT values ($Z=-4.237$, $p<0.001$) and hs-cTnI values ($Z=-4.822$, $p<0.001$). In only 5 (hs-cTnT) and 4 patients (hs-cTnI) was there an increase of >5 ng/L. There were 5 cases where the post-cardioversion values of both hs-cTnT and hs-cTnI were above the 50% reference change value. There was no relation between the change in hs-cTn values and sex, number of shocks, total energy delivered (even in those who received more than 1,000J), highest energy per shock, total current delivered, highest current delivered per shock or transthoracic impedance.

Conclusion(s): There is a statistically significant but very small change in median hs-cTnT and hs-cTnI values (1 ng/L and 1.2 ng/L respectively) after DC cardioversion. The results were similar even in patients where high energy shocks were delivered and did not vary based on the pre cardioversion baseline value. Patients who have marked troponin elevations after cardioversion should be assessed for other causes of myocardial injury. It should not be assumed that they have myocardial injury from the cardioversion alone.

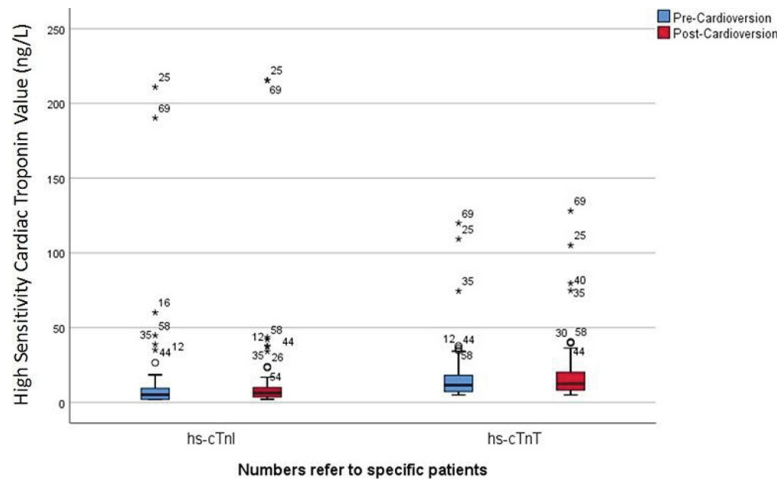


Figure 1

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