The Electrical Mechanical Interference of Implantable Cardiac Devices at Computed Tomography Scanning

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Background: X-ray radiation during computed tomography (CT) scanning has been reported to cause electrical mechanical interference (EMI: oversense and partial electrical reset) in implantable cardiac device. It remains elusive whether EMI was occurred by clinical CT scan condition. Purpose: Our purpose is to investigate the association of EMI with the clinical CT scan conditions. Method: Implantable cardiac device (cardiac pacemaker, biventricular pacemaker: CRT-P, biventricular pacemaker with implantable cardioverter defibrillator: CRT-D, Medtronic) with its electrode lead sink in a tank filled with saline. CT (Tohshiba: Aquillion 64) scanned Implantable cardiac device with scan conditions in our hospital. The x-ray radiation level was set at the maximal value of the CT scanner (helical scanning i.e., tube voltage: 120 kV, tube current: 300 mA, scanning interval: 5 mm, helical pitch 53, rotation speed 0.35 sec/rot). Results: CT radiation inhibited the pacing pulses of cardiac pacemakers due to oversense of noise. When CT scanned CRT-P, Partial electrical reset was occurred. When CT scanned CRT-D, CRT-D understood frequent noise as ventricular fibrillation. However, cardioversion was not delivered because CRT-D was suffered from radiation exposure with short duration. Conclusion: EMI in implantable cardiac devices could not be avoided with clinical scan condition. The radiological technologists could take proper care of implantable cardiac devices at the time of CT scan. Keywords: electrical mechanical interference, computed tomography, implantable cardiac device