Neprikladna terapija ugradbenim kardioverter defibrilatorom kao posljedica detekcije vanjske izmjenične struje

Inappropriate therapy with implantable cardioverter defibrillator resulting from detection of external alternating current

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Ugradbeni kardioverter defibrilator (ICD) već dugi niz godina najznačajniji je uređaj u sprječavanju iznenadne srčane smrti uzrokovane malignim aritmijama, bilo u primarnoj, ili sekundarnoj prevenciji.¹ Sam uređaj izrazitom preciznošću, programiranom osjetljivošću od 0,3 mV prepoznaje finu amplitudu ventrikulske fibrilacije (VF) te nakon detekcije, potvrde aritmije, isporuči programiranu terapiju. U jednom malom broju elektromagnetska interferenca nekog vanjskog izvora može prikriti kardijalni signal i dovesti do neprikladne isporuke šoka. Izvor elektromagnetske interferencije koju uređaj senzira umjesto kardijalnog signala najčešće su neispravni električni uređaji, razni stimulatori mišića, transkutana nervna stimulacija, izmjenična struja 50 Hz kod neispravne kućanske instalacije (što je slučaj u starim stambenim objektima), rad s električnim uređajima na kiši, čišćenje akvarija kada su neki njegovi sustavi pod naponom. Zapravo rad s bilo kojim neispravnim električnim uređajem, a posebno u vlažnim uvjetima može dovesti do curenja izmjenične električne struje, a time i detekcije te iste struje od strane ICD-a.

Prilikom redovitih kontrola implantiranih ICD-a naših pacijenata uvidjeli smo u memorijama uređaja određeni broj epizoda kod kojih je došlo do prikrivanja kardijalnog signala elektromagnetskom interferencom, a samim tim detektirane i netočno interpretirane aritmije. U jednom slučaju ICD je uslijed dužeg utjecaja izmjenične struje minimalne snage detektirao VF i isporučio neprikladni šok. Događaj se zbio za vrijeme tuširanja pacijenta u kadi, a s nepravilno izvedenom instalacijom u staroj stambenoj kući. Prva preporuka pacijentu je da se tušira s isključenim električnim uređajima u kupaoonici, a sljedeći korak izmjena i reparatura električne instalacije od strane stručnoga osoblja.

Implantable cardioverter defibrillator (ICD) has been for a long time the most important device in prevention of sudden cardiac death caused by malignant arrhythmias, be it in primary or secondary prevention.¹ The device uses extreme precision and programmed sensitivity of 0.3 mV to recognize fine amplitudes of ventricular fibrillation (VF) and, following detection and arrhythmia confirmation, delivers programmed therapies. In a small number electromagnetic interference from an external source can conceal the cardiac signal and lead to inappropriate shock delivery. The electromagnetic interference that the device senses instead of a cardiac signal is usually caused by faulty electrical devices, various muscle stimulators, transcutaneous nerve stimulation, alternating current of 50 Hz in defective home installations which is the case in old housing objects, working with electrical appliances in the rain, cleaning of fish tanks while it's systems are under voltage. Actually, working with any kind of faulty electrical appliance, especially in moist conditions, can lead to leakage of alternating electrical current and detection of that current by the ICD.

During regular check-ups of implanted ICDs in our patients we have noticed a certain number of stored episodes when the cardiac electric signal was disguised with electromagnetic interference, ensuing in a detected and inaccurately interpreted arrhythmia. In one case ICD had, due to a longer lasting influence of alternating current of minimal power (voltage), detected VF and delivered an inappropriate shock. The event happened while the patient was taking a shower in a bathtub with inappropriately designed electrical installations in an old apartment building. The first recommendation to the patient was to take the shower with all the appliances turned off inside the bathroom, and the next step would be changing and repairing electrical installations by professional staff.

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LITERATURE

1. Chan NY, Wai-Ling Ho L. Inappropriate implantable cardioverter defibrillator shock due to external alternating current leak: report of two cases. *Europace*. 2005;7(2):193-6. DOI: <http://dx.doi.org/10.1016/j.eupc.2004.09.010>