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CASE REPORT

Journal of Clinical Case Reports and Reviews

An electrical nightmare: 105 inadequate ICD-shocks in a patient with broca aphasia

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Abstract

With a growing number of ICD-recipients, device complications are seen more frequently in the clinical setting and outpatient departments. Amongst the most severe are ICD-infections and inadequate shocks caused by oversensing of atrial tachycardia or lead fracture. We report on a 76-year-old female patient with dilative cardiomyopathy and broca aphasia after stroke, who experienced 105 consecutive inadequate ICD-shocks due to cluster missensing of her fractured ICD-lead. The diagnosis was complicated and delayed by the patient's aphasia emphasizing the need for intensified remote monitoring, especially in elderly and dependent patients.

Case report

A 76-years-old female patient was admitted to our emergency department early in the morning with suspected acute coronary syndrome. The patient had suffered from a major stroke causing broca aphasia three months ago and was referred to us from a nearby neuro rehabilitation clinic. Initial ECG showed no signs of acute ischemia, but Troponin I levels were about 1000-fold elevated. History taking was complicated by the patient's aphasia, but she did not appear to be in acute pain at the time of admission.

With a history of heart failure and an implanted single-chamber-ICD the patient was brought to the catheter lab to perform coronary angiogram, where no culprid lesion could be detected.

In a phone consultation with the rehab clinic's doctor in charge he described how the patient had multiple episodes of acute chest and back pain with 'electrical twitches' for the course of several hours during the past night. Pain medication was administered but no other diagnostic or therapeutic steps were taken. In the morning a troponin test was found positive and the patient referred.

Subsequently we performed an ICD interrogation, which revealed an EOS (end of service) status and 105 inadequate ICD shocks in the time between 0:30 AM and 04:30 AM until the battery of the Biotronic ICD was empty and the device eventually stopped antitachycard therapy. The shocks were caused by cluster mis-sensing on her right ventricular lead (Figure 1), presumably resulting from an isolation defect or lead fracture. Further episodes of over sensing due to lead fracture could be seen over the last five months, occasionally followed by antitachycard pacing but no shock therapy.

The ICD was implanted in 2008 and exchanged for EOL (end of life) in 2015. The last ambulatory interrogation was in September 2016, just before the first episodes of cluster mis-sensing occurred. The next appointment was scheduled for March 2017 but postponed due to the prolonged hospital stay after apoplexy. The technical analysis of the explanted ICD did not show any technical abnormalities. After discussing the case with the patient's family the defective lead was disconnected and at the request of the patient and her family a new ICD and lead was implanted and the patient enrolled in our remote monitoring program.

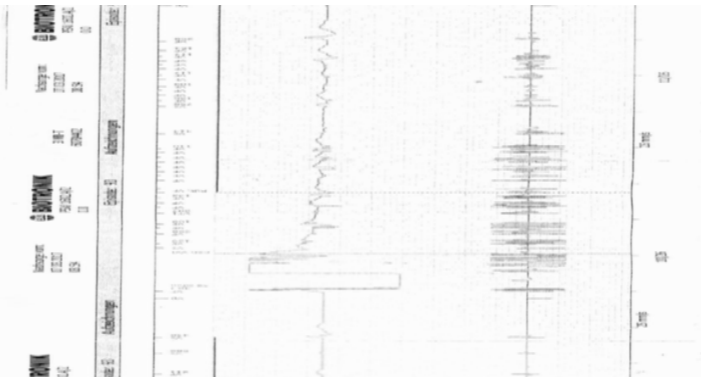

Figure 1. *Inadequate shock. Typical high frequency signals (cluster) in the PS-channel indicating a lead isolation problem.*

Discussion

Since the first trans venous ICD was implanted in 1989 there is a steadily growing number of ICD implantations and patients with long lasting devices. In the year 2017 there were 1.5 million pacemaker and ICD implantations worldwide. Simultaneously the lead- and generator associated complications increased over the last years. Lead associated complications include thrombosis, endoplastitis, as well as fracture, and isolation problems with the risk of inadequate shocks. From large clinical trials we know, that about 5-20% of ICD carriers receive inappropriate therapy, mainly due to mis-sensing of supraventricular arrhythmias, over sensing of external noise or lead fracture/insulation defects [1].

Figure 2. *Scorched battery of the Biotronic ICD (Iforia 3 VR and Linox SD lead) due to an assumed lead isolation defect near the header.*

The psychological impact of inappropriate ICD shocks was investigated in several studies. Among the most frequent side effects are anxiety disorders, post-traumatic stress disorders, panic attacks, depression, nightmare and insomnia [2].

This case demonstrates possible pitfalls of ICD-supply in elderly or handicapped people. The inability of the patient to communicate properly and missing awareness of the staff led to the dreadful course of events. The suspected short circuit between the lead and the scorched battery (Figure 2) might have reduced the current delivered to the whole body and weakened the pain, still the delay in therapy was unnecessary and avoidable. Immediate ECG monitoring would have helped to discover the cause for shock delivery and could have led to shock suppression by simply applying a magnet.

Conclusion

Remote monitoring programs should be further established and always used as Gold standard when available. The transmission of technical data to experts is known to be very effective to detect early malfunctions of implantable devices as ICDs and pacemakers. This clearly helps to avoid inappropriate shocks, detects lead and battery problems and discovers atrial fibrillation or other arrhythmias.

With the increasing number of ICD-, pacemaker- and CRT-carriers further training programs for out-patient departments and GPs should be installed since there is a significant lack of knowledge concerning ICD function and troubleshooting.

References

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Rec: May 11, 2018; Acc: May 26, 2018; Pub May 31, 2018

J Clin Case Rep Rev. 2018;1(2):11
DOI: gsl.jccrr.2018.000011