CASE REPORT

Asystole Detected by Implantable Loop Recorders: True or False?

Hussam Ali, M.D., Antonio Sorgente, M.D., Ph.D., Elisabetta Daleffe, M.D., and Riccardo Cappato, M.D.

From the Arrhythmia and Electrophysiology Center, IRCCS Policlinico San Donato, Milan, Italy

We report a case of a false asystole detected by an implantable loop recorder a few days after its implantation. In the discussion section we try to give some hints to help cardiac electrophysiologists in distinguish true from false asystoles, in order to avoid useless and potentially dangerous implantations of pacemakers.

Ann Noninvasive Electrocardiol 2014;19(6):595–597

implantable loop recorder; asystole; pacemaker

CASE REPORT

We here describe the first interrogation of an implantable loop recorder (ILR) in a 79-year-old woman with infrequent syncopal episodes. Several asymptomatic episodes of prolonged asystole have been auto-recorded within the first 2 days following ILR implantation (Fig. 1) shows 2 of these episodes: normal sinus rhythm is transiently broken by a prolonged (>3 seconds) asystolic pause in both cases. Are they true? Does this patient need a pacemaker implantation?

DISCUSSION

We would like to use this case to give a few tips potentially useful in discerning true from false episodes of brady arrhythmias. Generally, this type of troubleshooting can be obtained using clinical and electrogram-related information.

Clinical Hints:

- (a) Very prolonged asymptomatic pauses are unlikely to be true events unless occurring at night or in unreliable patients (very old or affected by dementia/cognition deficit).
- (b) Asystolic episodes detected in the early post-operative phase after ILR implantation are unlikely to be reliable. First, ILR is usually implanted in patients with sporadic syncopal events and inconclusive prolonged diagnostic workup, making it unlikely for a clinical event to occur just within the first days after implantation. Second, autorecorded asystolic episodes in the first days after implant may occur because of poor interface-contact between the device and the overlying subcutaneous tissue.¹ A loose pocket and air entrapment may represent the cause of this intermittent loss of cardiac signals. Subsequently, maturation of the device-tissue interface should provide optimal contact and proper sensing. In our case all episodes were recorded during the 2 days after implantation, when the patient started to be active. However, ILR interrogation prior to discharge may miss this phenomenon as it is usually performed with the patient lying down and the programmer's head positioned over the device pocket. Creating a tight device pocket may help in overcoming this issue.
- (c) Circumstances associated with external interference such as magnetic resonance imaging (MRI),² antitheft surveillance systems cameras,

Address for correspondence: Dr. Antonio Sorgente, M.D., Ph.D., Electrophysiology and Arrhythmia Center, IRCCS Policlinico San Donato, Via Morandi 30, 20097 San Donato, Milanese, Milan, Italy. Fax: +390255603125; E-mail: sorgente.antonio@gmail.com

Figure 1. Panel (A) ILR recording showing inappropriate autodetection of asystole the second day after implantation. Normal sinus rhythm is suddenly interrupted by a false asystolic episode, due to loss of interface contact. Note the artifacts (black asterisks) at the onset and the offset of the episode, with the offset artifact being sharper than the onset one. Panel (B) ILR recording showing another example of false asystole. Note that the episode is preceded by gradual deterioration of sensing (white arrows). VS = ventricular sensing; AD = asystole detection. RR intervals are displayed in milliseconds.

cellular telephone, and media player³ may cause inappropriate detection of heart rhythm and may provoke false asystole. Nevertheless, these episodes are often associated with artifacts indicating the presence of external interference source.

Electrogram-Related Hints

(a) Artifacts:

The presence of artifacts is a key point to recognize inappropriate detection of asystole by ILR. False asystolic episodes owing to loss of interface contact are typically associated with artifacts at the onset and/or offset of the episode. In our case, all episodes were associated with these artifacts with the offset being sharper than the onset ones, because of a sudden contact restoration just prior to sensing recovery. Artifact owing to syncope/fall or direct thump to the device during a real brady arrhythmia does not occur at the asystole onset but usually after several seconds leading to loss of consciousness and fall. As mentioned above, external interference like MRI may cause

inappropriate detection of asystole and is often associated with artifacts.

(b) Associated rhythm disorders:

True asystolic episodes, unlike false ones, are often preceded, and/or followed, by a phase of rhythm disturbance as marked sinus bradycardia, escape rhythms or PR prolongation (Fig. 2) shows a true asystolic episode associated with bradycardia and wide QRS escape beats.

(c) P waves during the episode:

Episodes of "real" AV block, showing distinct P waves with dropped QRS complexes, are unlikely to be false episodes. Nevertheless, during sensing deterioration, QRS complexes might mimic P waves creating a "false" episode of complete AV block.⁴

(d) Sensing preceding the episode:

Sensing on ILR recording may vary with patient activity/position. Therefore, signal evaluation just

Figure 2. Continuous ILR recording showing a true episode of asystole in another patient, characterized by a phase of bradycardia, wide QRS escape beats (black asterisks) and absence of artifacts at the onset/offset of the episode. VS = ventricular sensing; AD = asystole detection; VR = ventricular refractoriness, B = bradycardia. RR intervals are displayed in milliseconds.

prior to the recorded episode is important as asystole preceded by a phase of marked sensing deterioration may be due to complete loss of sensing rather than to true asystole (Fig. 1B). shows gradual deterioration until complete loss of sensing.

In conclusion, careful interpretation of the clinical scenery and the recorded electrograms is the key to recognize inappropriate detection of asystole by ILR. This is crucial to avoid unnecessary invasive therapy like pacemaker implantation.

REFERENCES

1. Bortnik M, Occhetta E, Magnani A, et al. Inappropriate asystole detection in early postoperative phase after loop recorder implantation. *ISRN Cardiol* 2011;2011:146062 (1-3).
2. De Cock CC, Spruijt HJ, Van Campen LMC, et al. Electromagnetic interference of an implantable loop recorder by commonly encountered electronic devices. *Pacing Clin Cardiol* 2000;23:1516-1518.
3. Thaker JP, Patel MB, Jongnarangsin K, et al. Electromagnetic interference with pacemakers caused by portable media players. *Heart Rhythm* 2008;5:538-544.
4. Chrysostomakis SI, Simantirakis EN, Marketou ME, et al. Implantable loop recorder undersensing mimicking complete heart block. *Europace* 2002;4:211-213.