

# Pacemaker lead disposition in an elderly patient - Reel syndrome

Farhat Fouladvand, Oktaj Maksudov

UMBAL Heart and Brain hospital Burgas, Bulgaria, Bulgarian Cardiac Institute

**Abstract** We present the case of an adult patient with Reel syndrome who had a VVI-mode permanent pacemaker implanted 6 months earlier. X-ray revealed the retraction and winding of the right ventricle chamber electrode around the pulse generator. Subsequently, a new electrode was re-implanted in the right ventricle apex.

**Key words** Reel syndrome, pacemaker

## Introduction

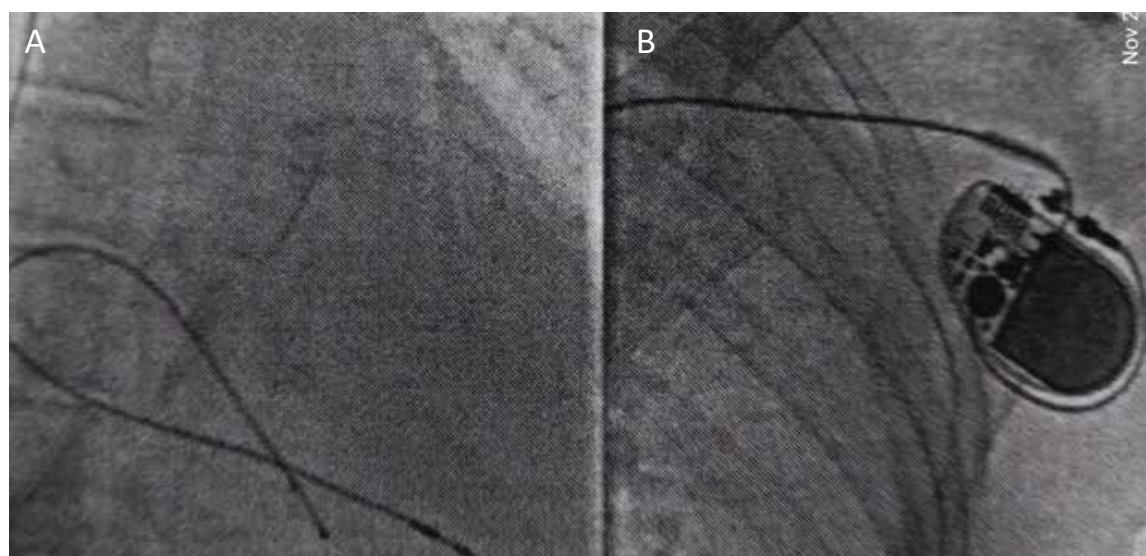
Reel syndrome is an infrequent case of pacemaker dysfunction due to dislocation of the atrial/ventricular or both leads. The cause is the movement of the pulse generator along its long axis in the patient's subcutaneous pocket. This leads to the detachment of the electrode from the point of fixation and subsequent dislocation, retraction and winding of the electrode around the device. It is most often observed in adult patients with cognitive impairment. For the first time, a similar condition (Twiddler Syndrome) was described by Bayliss and Collegium in 1968 as a post-implantation implant of a permanent pacemaker [1], and subsequently reported for implantable cardioverter defibrillators (ICDs)[2], and cardiac resynchronization devices. (CRT) [3].

## Case presentation

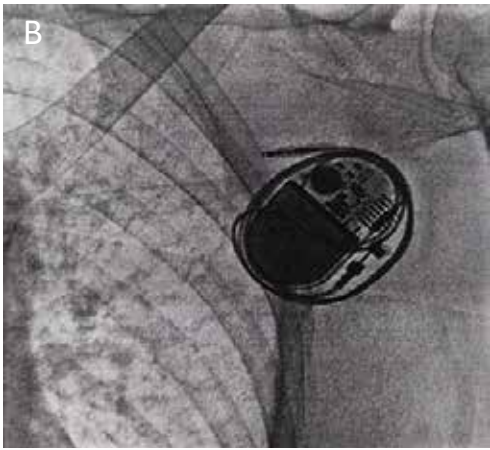
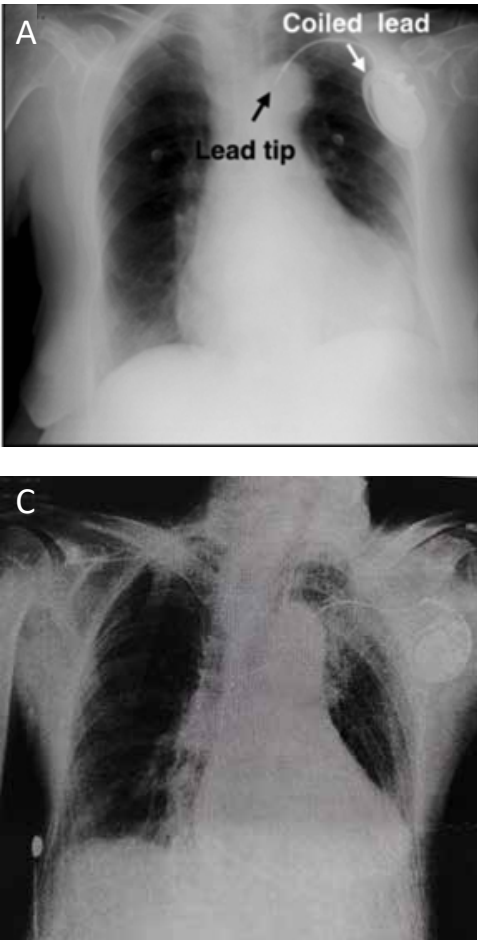
A 85-year-old man, admitted to the cardiology department in September 2019 due to chest pain and multiple

syncope. Patient had medical history of hypertension and dyslipidemia. The patient was in an impaired general condition, with evidence of cervical venous congestion, lack of breathing in the left thoracic half, and bradycardia. The ECG showed a complete AV block with a heart rate of 80 bpm (class I A indication for implantation of an anti-bradycardia device). Echocardiographic evaluation revealed a reduced ejection fraction and dilated Vena Cava inferior.

Following implantation of a temporary pacemaker, selective coronary angiography was performed, which revealed a two-vessel coronary artery disease - critical LAD stenosis, which was resolved by implantation of a single drug-eluting stent and chronic occlusion of the RCA, with collaterals from LAD. Subsequently, under a local anesthesia, in the left subclavian area, a single-chamber, permanent VVI pacemaker was implanted, with RV-lead with active fixation (Figure 1). After optimizing the drug therapy, the patient was discharged with and with 100% paced rhythm.



**Figure 1.** (A) Electrode from temporary PM and lead from VVI in RV and the pulse generator, (B) after the PM implantation



**Figure 2.** Six months later: (A) The chest X-ray of pacemaker placement - coiled lead; (B) Complete displacement of permanent pacemaker’s RV lead, which is curved around the pacemaker itself; (C) The chest X-ray of pacemaker placement on discharge from hospital

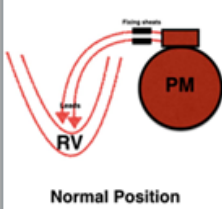
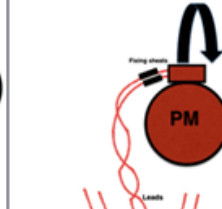
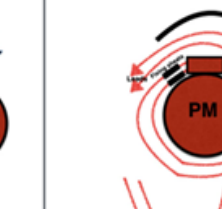
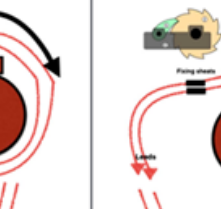
Six months later, during an admission to the urology department for hematuria, the patient felt a general malaise and difficulty in speech, according to relatives. After an ECG and consultation with a cardiologist on duty, he was referred to the clinic with suspected dysfunction of the pacemaker. The ECG performed registered a complete AV block. Following implantation of a temporary pacemaker, a chest x-ray (Figure 2A) was performed,

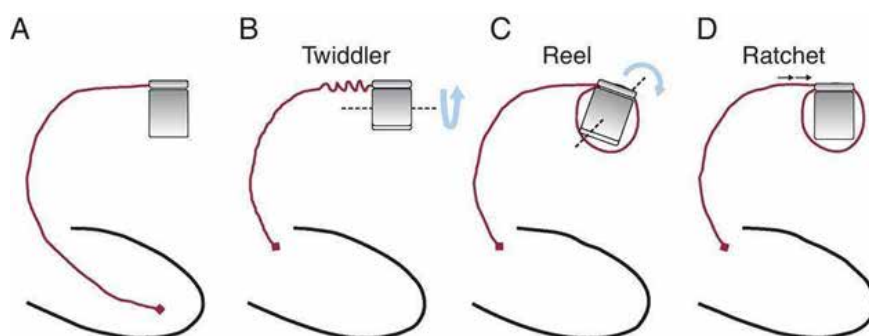
which showed a complete displacement of permanent pacemaker’s RV lead, which was curved around the pacemaker itself (Figure 2B). A new RV electrode with active fixation was implanted in the apex of the right ventricle. The silicone sleeve of the electrode was firmly sutured to the fascia of the thoracic muscle. The patient was discharged with an x-ray showing proper position of the RV electrode and with pacemaker rhythm on ECG (Figure 2C).

**Discussion**

Reel Syndrome [Table 1, Figure 3C] is rare condition and is seen in elderly patients with cognitive obese patients, women, and children which mostly occurs during the first year after implantation. It is characterized by the unintentional rotation of the pulse generator along its sagittal axis by the patient, which leads to retraction and winding of the electrode around the pacemaker, causing

**Table 1**

|                                                                                     | Twiddler                                                                            | Reel                                                                                | Ratchet                                                                              |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Mechanism                                                                           | Rotation on its long axis                                                           | Rotation on its transverse axis                                                     | Retraction with ratcheting of the lead                                               |
| Consequences on Leads                                                               | Damage can occur                                                                    | No damage                                                                           | No damage                                                                            |
| X-Ray                                                                               | Tangling of leads                                                                   | Leads coiled around the generator                                                   | Leads retracted without coiling                                                      |
| Occurrence                                                                          | Within a year                                                                       | Within a month                                                                      | Within a month                                                                       |
|  |  |  |  |



**Figure 3.** Presentation of lead dysposition

the dysfunction of the device. The reason is the unintentional manipulation of the device in the subcutaneous pocket.

Two other similar conditions have been described - Twiddler [Table 1, Figure 3B] and Ratchet [Table 1, Figure 3D] syndrome with a similar etiology (4,5). The first one has a rotation of the pulse generator along its long axis with retraction and twisting of the electrodes similar to a spiral, which can damage them. Ratchet syndrome is characterized by the fact that patient manipulates the pacemaker in a clockwise and anticlockwise direction, thus like a ratchet mechanism, retracts and locks the electrode without disposition of the pacemaker.

The first choice method in diagnostic work-up for specifying dysfunction of a permanent pacemaker is to perform a chest X-ray. Another option is through a pacemaker programming device. These conditions can also be observed with implantable cardioverter defibrillators (ICD), and resynchronization devices (CRT-D / P). Complications of these dysfunctions can lead to syncope with subsequent trauma or life-threatening tachyarrhythmias.

There are various countermeasures, such as re-tightening the loose attachments, affixing the pacemaker to the underlying fascia, and deep brain stimulation (for dystonia). However, there are not many reports that focus

on countermeasures. Although there are many reports of the pacemaker being attached under the fascia, this method does not guarantee a solution every time.

Patient education, use of a smaller subcutaneous pocket, and suturing of the pulse generator to surrounding tissues would lead to a decrease in the frequency of displacement syndromes in susceptible patients. Frequent check-ups and patient monitoring should not be underestimated.

## References

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## Sažetak

### Dispozicija odvoda pejsmejke kod starijih pacijenata - Reel sindrom

Farhat Fouladvand, Oktaj Maksudov

UMBAL Heart and Brain hospital Burgas, Bulgaria, Bulgarian Cardiac Institute

Predstavljamo slučaj odraslog pacijenta sa Reel sindromom kome je implantiran VVI stalni pejsmejker 6 meseci ranije. Rendgen grudnog koša je pokazao retrakciju i uvijanje electrode za desnu komoru oko generatora, koja je rešena ponovnim postavljanjem nove electrode u vrh desne komore.

Ključne reči: Reel sindrom, VVI pejsmejker