

Malpositioned Pacemaker Lead Presenting as a Peculiar 12-Lead EKG

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Malpositioned Pacemaker Lead Presenting as a Peculiar 12-Lead EKG

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Introduction:

Proper pacing lead position and implant complications are most often recognized within the first 24 hours of a procedure¹ using a combination of history, physical exam, EKG/programmer interrogation and chest X-Ray. We present a patient with a 10 year history of atypical signs and symptoms who presented to our institution for a pacer generator replacement.

Case Presentation:

- 63 year old male with multiple co-morbidities that included: CAD, DM, OSA and HTN underwent dual chamber pacer implant at an outside hospital in 2001 for complete heart block (St. Jude Medical 5330L Affinity DR). Although 12-lead EKG was obtained on several occasions, he was followed without incident at his original pacer clinic until a generator change was performed in 2007. However, he presented to our institution for another generator replacement in 2010 and the following EKG was obtained (Fig. 1).
- Device interrogation demonstrated the following: Atrium: Pwave=1.0mV, Threshold: 3.5V@0.8msec; Right Ventricle (actually CS): Rwave=2.5mV. Threshold: 2.5V@0.6msec. The conduction abnormality and electrical axis were felt to be peculiar and warranted further evaluation.
- A PA-LAT CXR was obtained (Fig. 2), demonstrating the “RV lead” to be positioned in the coronary sinus. Clinically, the patient had complained of decreased feeling of well being and mild dyspnea on exertion. In view of the long history of chronic lead implantation and the patient’s progressive symptoms, it was elected to “upgrade” his dual chamber pacer to a CRT-P (Fig. 3). Implant parameters: Atrium: Pwave=2.6mV, Threshold: 1.25V@1.0msec; Right Ventricle: Of note, echocardiogram demonstrated preserved LV systolic function.

Figure 1. Baseline EKG Prior to Generator Change

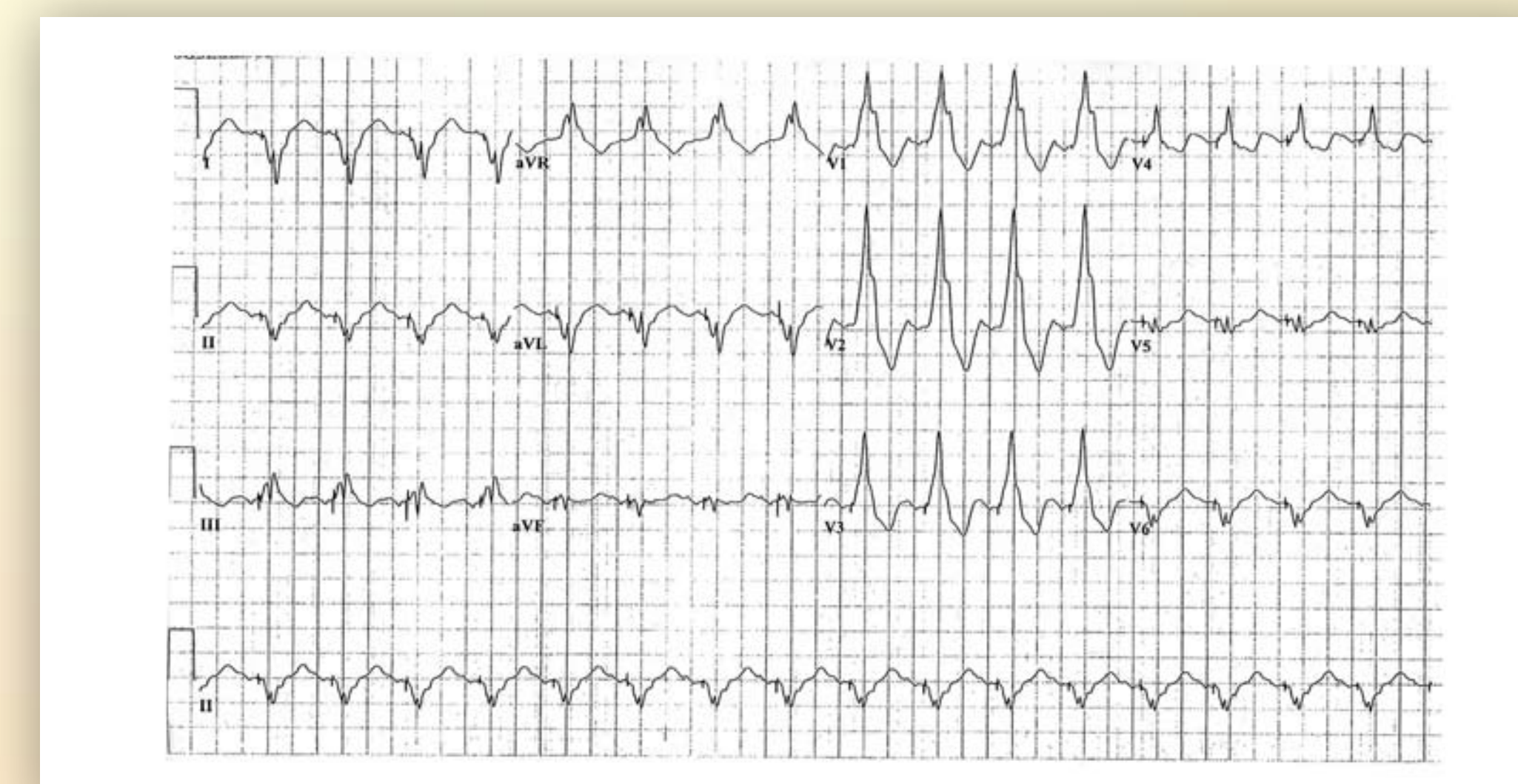


Figure 2. PA and LAT Chest X-Ray of original implant

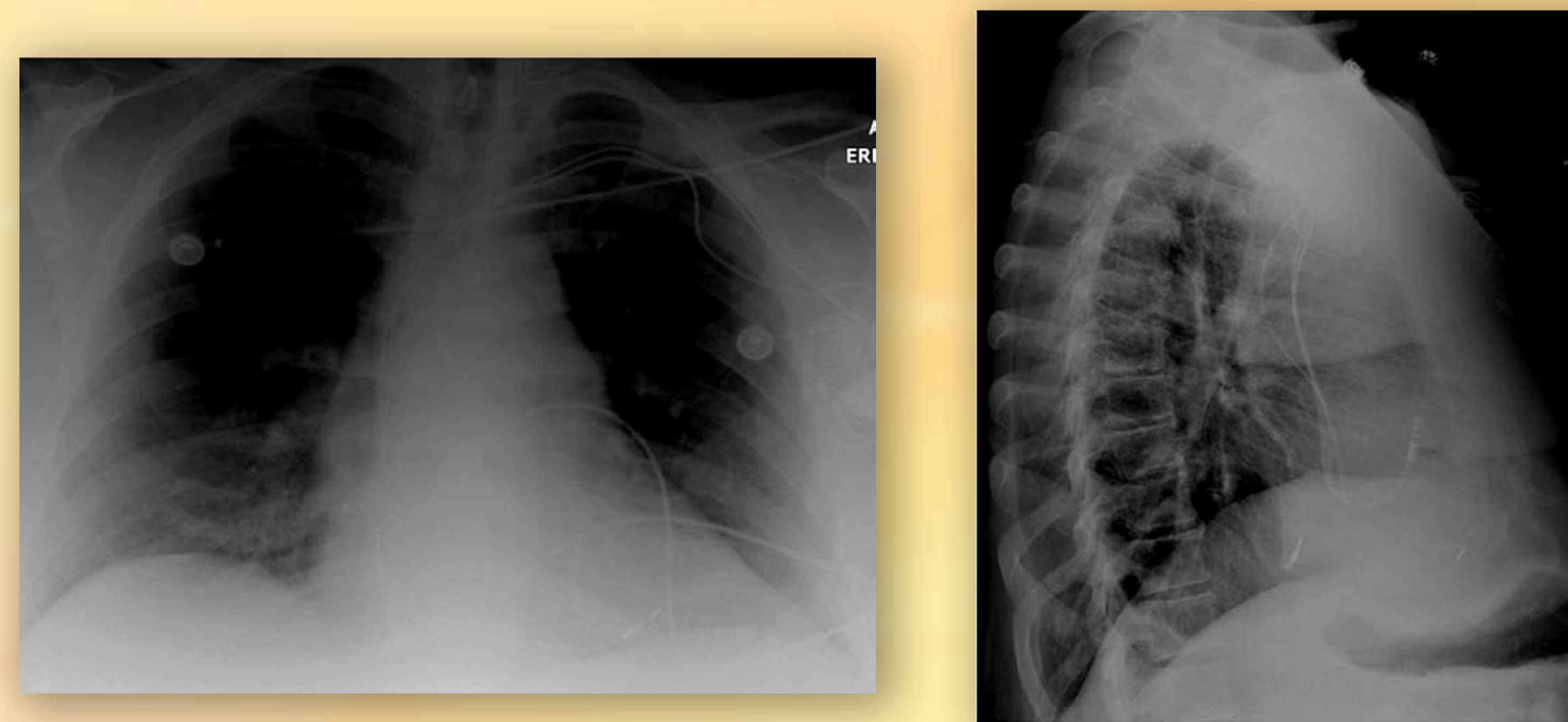
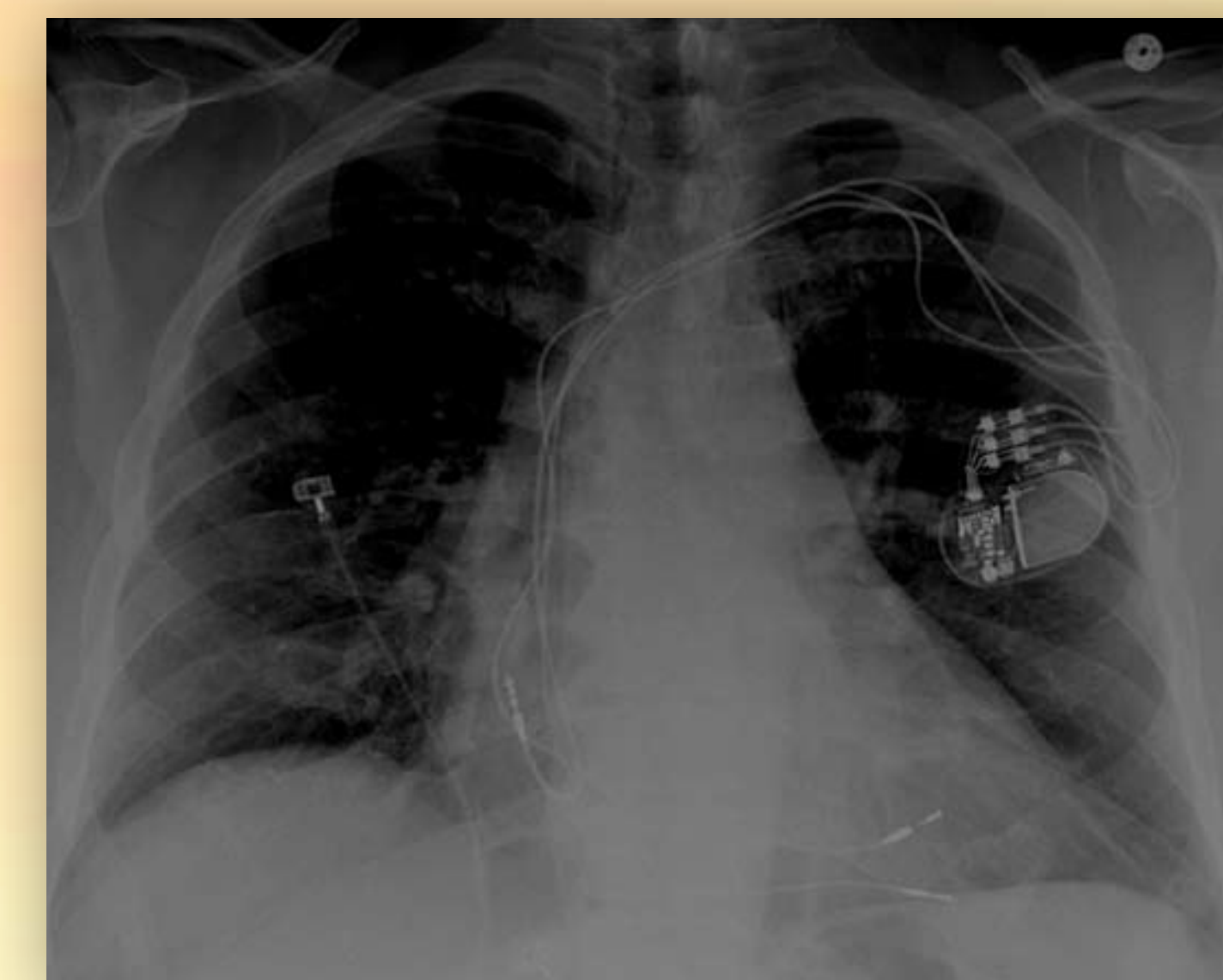


Figure 3. PA CXR of “upgraded” system and new EKG

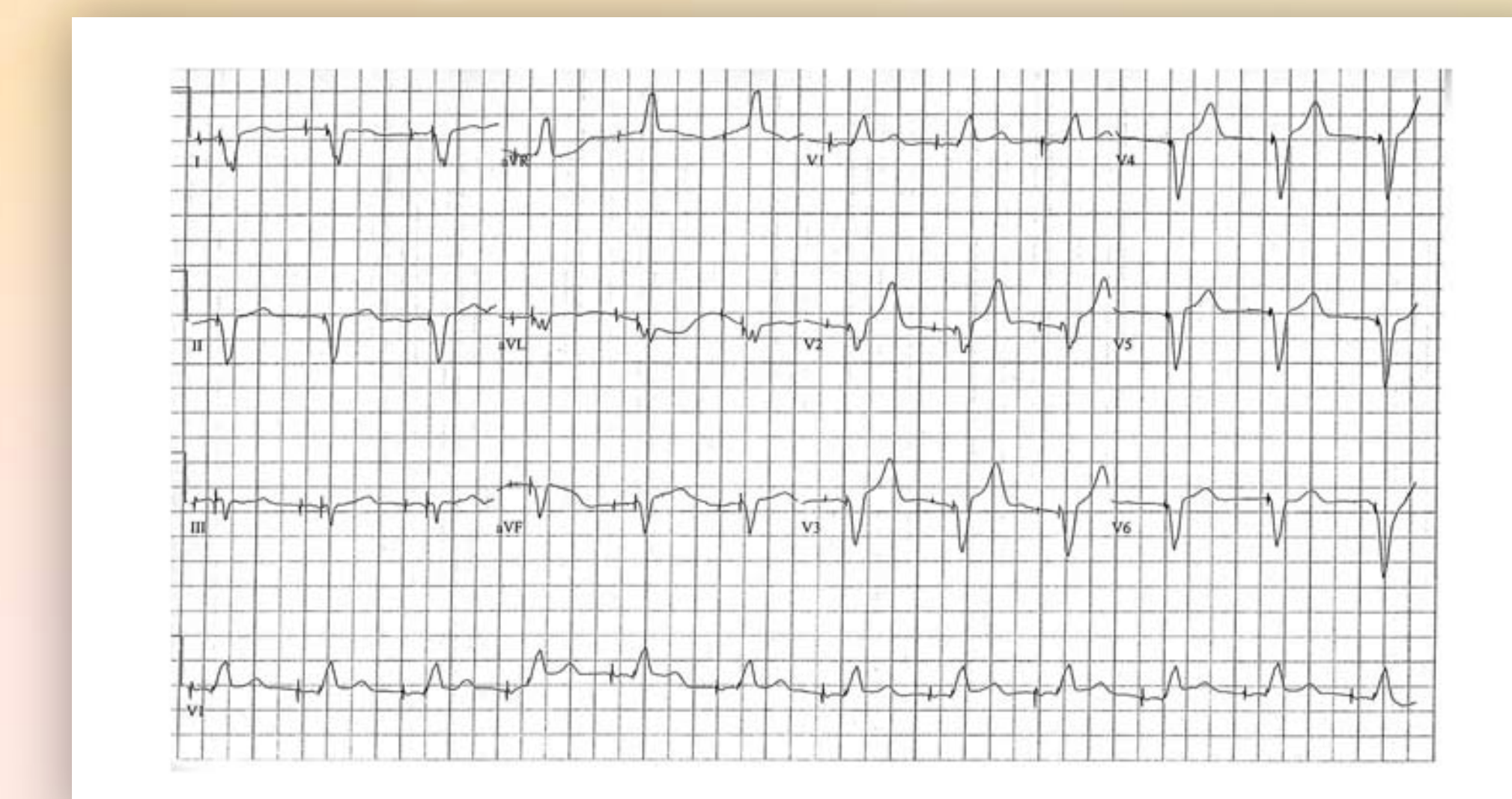


Discussion:

- The differential diagnosis of the 12 lead EKG presented included: CRT pacing (which was not possible given the known dual chamber nature of the implanted system), perforation of the RV lead into the LV chamber, or pacing from an alternative site that was stimulating the LV chamber². However, examination of the CXR makes the diagnosis apparent.
- The above patient presentation raises the following dilemma. Extract the RV/CS lead and risk traumatic injury to the CS³ and other contiguous cardiac structures, versus, placing a new RV apical lead and “upgrade” the system to a CRT-P and potentially improve the patient’s functional status⁴. The possibility that the RV/CS lead could fail in the long term in this pacemaker dependent patient⁵, argued that pacing stability was of the utmost importance. Thus, the latter choice was made given the suboptimal anatomic position of the RV/CS lead and the probability of dyssynchronous LV/RV contraction (Fig. 2).

- Placement of a DDD pacer is a safe procedure⁶. The use of X-Ray fluoroscopy has been a standard tool for accurate lead placement⁷. Normal anatomic and electrical lead placement was assumed at the time of the original implant. However, closer examination of the X-Ray and the EKG suggest otherwise. It is theorized that a single plane imaging system was used, and no attempt to confirm RV lead position was made in the LAO projection. It is also theorized that multiple surface EKG leads were not in place at the time of implant. QRS morphology and axis would have been an additional set of parameters that could have been confirmatory as to correct lead position (Fig. 4).
- Clinically, the patient has done well and reports less dyspnea and improved functional capacity since his pacing system was “upgraded” and he was provided the “safety net” of an RV apical lead. From our review of the literature, we are unaware of a similar report such as this, with an isolated malpositioned RV/CS lead remaining in a stable anatomic position for 10 years, resulting in symptoms, albeit mild.

Figure 4. Typical EKG of RV apical pacing and CRT-P of “upgraded” system⁸



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